A novel argument for the universality of parsing principles

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Abstract

We show that previous work on Relative Clause attachment has overlooked a crucial grammatical distinction across both languages and structures tested: the selective availability of Pseudo Relatives. We reconsider the literature at the light of this finding and argue that, all else being equal, local attachment is found with genuine Relative Clauses and that non-local attachment preferences emerge in the contexts in which Pseudo Relatives are allowed. We conclude that apparent cross-linguistic variation in parsing preferences is reducible to grammatical factors. The results of two novel experiments in Italian support these conclusions.

Keywords: Locality, Attachment Preferences, Universality of Parsing Principles, Relative Clauses, Pseudo Relatives.

1. Introduction

In this paper we show that a confounding factor was ignored in the literature on Relative Clause (RC) attachment preferences in complex NPs originated with the findings of Cuetos & Mitchell (1988): the asymmetric availability of Pseudo Relative Small Clauses (PRs)[1]. PRs and Relative Clauses (RCs), despite being string identical, are very distinct at the structural and interpretive level. Importantly, in the context of complex NPs, attaching to the most local NP is not a grammatical option with PRs, i.e. High Attachment is forced when PRs are represented. PRs are not available in all languages: they are grammatical in Spanish (French, Italian, Dutch a.o.) but not in English (Romanian, Basque, Chinese, a.o.). This means that, in certain contexts to be discussed below, an identical string is open to at least one additional interpretation / structural parse in Spanish. An interpretation / parse unavailable in English. Furthermore PRs are not available in all syntactic and semantic environment: like other type of Small Clauses, they are selected by a relatively small set of predicates and subjected to a number of syntactic and semantic constraints.

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[1]List of abbreviations: PR: Pseudo Relative; RC: Relative Clause; SC: Small Clause; HA: High Attachment; LA: Low Attachment; CE: Center Embedding; RB: Right Branching; DP: Determiner Phrase; NP: Noun Phrase; CP: Complementizer Phrase; VP: Verb Phrase; PP: Prepositional Phrase; Acc-*ing*: Accusative + progressive constructions.

Analyzing previous results on attachment preferences both across languages and across syntactic structures, we observe the following: everything else being equal (i.e. when factors such as e.g. prosody and referentiality are controlled for) a Low Attachment preference is observed in the presence of genuine Relative Clauses, i.e. when PRs are not allowed. When PRs are allowed, High Attachment preference is observed.

We speculate on the origin of this generalization and propose an account based on the structural and interpretive distinction between PRs and RCs. We then present the results of two novel studies on attachment preferences in Italian in which we manipulated PR availability. The results of both experiments strongly support the above generalization: a Low Attachment preference is observed in all conditions in which RC is the only available reading, while significantly more High Attachment preferences are observed when PRs are a grammatical option.

Finally, we claim that the data demonstrate that locality is a universal principle governing the human language parser and the apparent exceptions can be reduced to the variation in PR-availability across languages and structures. This does not mean to say that locality does not interact with other principles when it comes to RC attachment. As, e.g. Gilboy et al. (1995) show convincingly, *Referentiality* plays a major role in deciding RC attachment, the same is true of prosody. Importantly these interaction between principles of locality and referentiality / prosody (among others) generate the same outcome in all languages studied. What we set to explain here is the residual asymmetry in attachment across both languages and structures which is still left unexplained by previous approaches. We claim that when PR-availability is considered, much of this variation can receive a principled explanation which does not require postulating languages specific parsing mechanisms.

The structure of the paper is the following: section 1.1 briefly introduces the relevant literature on variation in RC attachment across languages, structures and individual processing capacity. The availability of Pseudo Relative Small Clauses (PR) (section 2). After having presented some core properties distinguishing PRs from genuine RCs (section 2.1), we will propose that the parser is more likely to resolve this ambiguity in favor of Pseudo Relatives over Relative Clauses, as the former are simpler on both structural and interpretive grounds 3. Sections 3.1 and 3.2 discuss the application of this distinction to previously observed attachment preference asymmetries across languages and structures respectively. Section 4 presents the results of two novel experiments on attachment preferences in Italian in which we manipulated PR availability. Section 5 sums up the findings and concludes with a research agenda to further investigate the role of PRs in attachment.

1.1. Asymmetries in Attachment Preferences

Principles of locality have been shown to regulate both structure building and filler-gap processes in language processing (*Right Association* Kimball 1973; *Late Closure* Frazier 1978; *Minimal Attachment* Frazier & Fodor 1978; *Minimal Chain Principle* De Vincenzi 1991; *Recency* Gibson 1991; *Merge Right* Phillips 1996, a.o.).[2]

(1) details a typical case of ambiguity in which such principles have been shown to apply:

(1)   John said that Bill arrived yesterday

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[2] While it is a matter of debate whether these, and other, principles of syntactic parsing apply in isolation from, and prior to, other factors involved in deciding the meaning of a sentence, e.g. context, plausibility, lexical idiosincrasy (see e.g. Altmann et al. 1998 on the effects of contexts in late closure), there is substantial consensus that principles of locality play a major role in human language parsing.

a. John [$_{VP}$ said [$_{CP}$ that [$_{IP}$ Bill [$_{VP}$ arrived yesterday]]]]

b. John [$_{VP}$ said [$_{CP}$ that [$_{IP}$ Bill [$_{VP}$ arrived]]] yesterday]

Principles of Locality, correctly predict (1-a), i.e. with the temporal modifier *yesterday* attaching to the most local potential host, to be the preferred interpretation.

Yet, this picture is not exempt from problems: Cuetos & Mitchell (1988) tested both English and Spanish speakers attachment preferences with RCs embedded within complex NPs (2). They found that while English speakers had a preference for Low Attachment (LA), i.e. appear to obey locality principles akin to Late Closure (2-a), Spanish speakers preferred High Attachment (HA), apparently disobeying locality (2-b).

(2)   a.   Someone shot the maid$_1$ of the actress$_2$ that$_2$ was$_2$ standing on the balcony

b.   Alguien disparó contra la criada$_1$ de la actriz$_2$ que$_1$ estaba$_1$ en el balcón

These findings, are not only at odds with the otherwise uniform Local Attachment preference found for other structures in the same languages (e.g. PPs) (Phillips & Gibson, 1997), led to question the universality of locality principles in processing and, as a consequence, of the very existence of universal principles of parsing, grounded on syntactic structures or otherwise. This, in turn, raised important theoretical problems with respect to a theory of language acquisition[3]

The second issue is in many respects far more critical than the first: while grammatical variation is amenable to principled explanations, cross-linguistic variation in parsing preferences in the absence of grammatical differences is much harder to deal with in a principled way. For these reasons, in the last two decades a great amount of work aimed at both testing attachment preferences across languages and structures and explaining the problematic findings. These studies confirmed that speakers of different languages differ in RC attachment preferences in complex DPs of the form NP1 P NP2 RC: besides English (Cuetos & Mitchell, 1988; Mitchell & Cuetos, 1991; Gilboy et al., 1995; Fernández, 1999, 2003; Frazier & Clifton, 1996, a.o.), a Low Attachment (LA) preference is found in e.g. Romanian (Ehrlich et al., 1999), Basque (Gutierrez-Ziardegi et al., 2004), Chinese (Shen, 2006), while a preference for High Attachment (HA) was reported in e.g. Dutch (Brysbaert & Mitchell, 1996; Mitchell & Brysbaert, 1998; Mitchell et al., 2000), French (Mitchell et al., 1990; Frenck-Mestre & Pynte, 2000b; Zagar et al., 1997), Italian (De Vincenzi & Job, 1993, 1995), Russian (Sekerina, 1997, 2004; Fedorova & Yanovich, 2004, 2006b,a; Dragoy, 2007) and Greek (Papadopoulou & Clahsen, 2003).

To complicate things further, variation within the same languages for similar structures was reported across studies. Brazilian Portuguese was classified as an LA language by (Miyamoto, 1999), but Maia & Maia (2001); Ribeiro (1998, 2005) have shown a consistent preference for HA among its speakers. A similar situation arises with German, traditionally classified as HA preference language Hemforth et al. (2000b,a), but shown to behave in accordance with LA languages by Murray et al. (2000) and more recently Augurzky (2005). It's hard to say how much of this variation is due to dialectal variation and / or induced by differences in experimental design (see Fernández 2003 for discussion of this matter).

Table 1 and 2 (adapted from Augurzky (2005)) summarize these results divided by LA and HA languages respectively.

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[3]As Fodor (1998a, p. 285) puts it: *The whole explanatory project [...based on the hypothesis that the processing mechanism is fully innate and applies differently to different languages only to the extent that their grammars differ ...] is in peril because of the discovery that Late Closure is not universal.*

LA Languages	
Arabic	Abdelghany & Fodor (1999); Quinn et al. (2000)
Basque	Gutierrez-Ziardegi et al. (2004)
**Bulgarian	Sekerina et al. (2003)
Chinese	Shen (2006)
English	Cuetos & Mitchell (1988); Mitchell & Cuetos (1991), Gilboy et al. (1995); Fernández (2003), Frazier & Clifton (1996)
**German	Augurzky (2005); Murray et al. (2000)
Norwegian	Ehrlich et al. (1999)
**Portuguese	Miyamoto (1999)
Romanian	Ehrlich et al. (1999)
Swedish	Ehrlich et al. (1999)

Table 1: Summary of studies reporting LA for the languages indicated. Note: "*" precedes contrasting results.

HA Languages	
Afrikaans	Mitchell et al. (2000)
**Bulgarian	Sekerina et al. (2003)
Croatian	Lovrić (2003)
Dutch	Brysbaert & Mitchell (1996); Mitchell & Brysbaert (1998), Mitchell et al. (2000); Desmet et al. (2002b)
French	Mitchell et al. (1990); Frenck-Mestre & Pynte (2000b), Zagar et al. (1997); Colonna et al. (2000), Colonna & Pynte (2001a)
Galician	Fraga et al. (2005)
**German	Hemforth et al. (1998, 2000b), Hemforth et al. (2000a,c), Konieczny et al. (1997); Konieczny & Hemforth (2000)
Greek	Papadopoulou & Clahsen (2003)
Italian	De Vincenzi & Job (1993, 1995)
**Portuguese	Ribeiro (1998, 2005), Maia & Maia (2001), Maia et al. (2006), Miyamoto (2005)
Russian	Sekerina (1997, 2004)
Spanish	Cuetos & Mitchell (1988); Carreiras & Clifton (1993), Carreiras & Clifton (1999); Cuetos et al. (1996), Gibson et al. (1999); Igoa et al. (1998), Gilboy et al. (1995); Mitchell et al. (1990)

Table 2: Summary of studies reporting HA for the languages indicated.

Variation across syntactic structures. Variation across languages is accompanied by variation *across syntactic structures* within the same language. In certain well-defined syntactic structures the cross-linguistic asymmetry in attachment disappears. The first such observation is due to De Vincenzi & Job (1993, 1995), who showed that RC HA preference in Italian (3-a) disappears in the contexts of thematic prepositions (3-b):

(3)   TYPE OF P   (De Vincenzi & Job, 1993, 1995)

    a.   Qualcuno ha sparato alla governante$_1$ dell'attrice$_2$ che stava$_1$ seduta in balcone
         Someone shot the maid of the actress that was sitting on the balcony
    b.   Qualcuno ha sparato alla governante$_1$ con l'attrice$_2$ che stava seduta$_2$ in balcone
         Someone shot the maid with the actress that was sitting on the balcony

Similar findings, were reported for other languages, including Spanish (Cuetos et al., 1996), English (Frazier & Clifton, 1996; Traxler et al., 1998), French (Frenck-Mestre & Pynte, 2000b; Zagar et al., 1997) and Greek (Papadopoulou & Clahsen, 2003).

    Similarly, Hemforth et al. (unpublished), show that Spanish speakers, just like English Speakers, demonstrate LA preference with complex NPs in subject position (5):

(4)   SUBJECTS   Hemforth et al. (unpublished)

    a.   The maid$_1$ of the <u>actress$_2$ that$_2$ was$_2$</u> on the balcony is blonde
    b.   La criada$_1$ de la <u>actriz$_2$ que$_2$ estaba$_2$ en el balcón</u> es rubia
         The maid of the actress that was sitting on the balcony is blonde

Fernández (2003) discusses the case of Spanish RCs introduced by the relative pronoun "*el cual*" (who) vs. the more common complementizer "*que*" (that). While, as seen above, HA is generally observed with the latter, a sharp preference for LA appear to be induced by the former:

(5)   RELATIVE PRONOUNS   (Fernández, 2003, p.31)

    Vi al hijo$_1$ del medico$_2$ el cual$_2$ estaba en el balcón
    I saw the son of the doctor who$_\text{rel-pro}$ was on the balcony

Attachment in 3 sites environments. Another notable environment in which the asymmetry between English and Spanish disappears is in the presence of 3 possible attachment sites. Gibson et al. (1996) observed a U-shaped attachment preference in both languages in the presence of 3 possible attachment sites, with highest preference for the most local NP3, followed by the least local NP1 and lastly by intermediate NP2. Gibson et al. (1996) tested sentence fragments, i.e. isolated nominals which might have been interpreted as subjects of a forthcoming matrix verb. An example of the stimuli is given in (6):

(6)   NOMINALS   Gibson et al. (1996)

    a.   The lamp$_1$ near the painting$_2$ of the house$_3$ that was$_{3 > 1 > 2}$ damaged by the flood.
    b.   La lámpara$_1$ cerca de la pintura$_2$ de la casa$_3$ que fué$_{3 > 1 > 2}$ dañada en la inundacíon.

Gibson et al. (1999) obtained similar results with full sentences containing the complex NPs in object position in Spanish. They conducted two experiments using the same materials modified to include either 2 or 3 NPs. In the two-NP condition (7-a) the usual HA preference emerged, while in the three-NP condition (7-b) they observed the U-shaped preference identified in Gibson et al. (1996).

(7) a. El astronomo predijo las órbitas$_1$ de los planetas$_2$ que$_{1 > 2}$ se observó desde el
         satélite.
         The astronomer predicted the orbits of the planet that was observed from the satel-
         lite.
     b. El astronomo predijo el cambio$_1$ de las orbitas$_2$ de los planetas$_3$ que$_{3 > 1 > 2}$ se ob-
         servó desde el satelite.
         The astronomer predicted the changes of the orbits of the planet that was observed
         from the satellite.

Similar findings were reported for Japanese and Brazilian portuguese (Miyamoto et al., 1999;
Miyamoto, 1999), while a different U-shaped pattern (NP1>NP3>NP2) was found by Wijnen
(1998); Wijnen et al. (1999) for Dutch and Dragoy (2007) for Russian.

Referentiality. Gilboy et al. (1995) demonstrated that Referentiality, and the type of relation
between the two NPs (e.g. functional *assistant of the inspector* vs. substance *sweater of cotton*)
plays a central role in deciding attachment preferences in a similar way across both English and
Spanish; see section 1.2 for discussion.

Prosodic Effects. Several studies have investigated the effects of prosody on RC attachment.
Following Fodor; Fodor; Fodor's (1998a; 1998b; 2002b) proposal that readers project a prosodic
contour while reading, which can in turn influence the syntactic parsing (see section(14)), many
researchers demonstrated that length manipulation, of either the RC and / or the NPs, strongly
affects attachment preferences. An effect of length was obtained consistently across languages:
a stronger preference for HA is found with longer RCs than with short ones. These effects make
perfect sense if the parser follows prosodic principles and tries to balance the length of different
prosodic phrases in the clause. Reading a long RC is easier if a prosodic boundary is placed at its
onset. This boundary in turn influences the syntactic parsing, making LA less likely to arise. The
resulting prosodic phrases are well-balanced, as the long complex NP is balanced by a long RC.
A short RC, on the other hand, can be more easily be part of the previous prosodic phrase and
the absence of a break pushes the syntactic parser to attach low (see Fernández, 2003; Augurzky,
2005, for discussion).

Differences between Offline and Online results. Online results, in HA languages like Italian (see
De Vincenzi & Job, 1993, 1995), have shown that reaction times at a disambiguating region
within the embedded clause are shorter when the disambiguating material matches the lower NP
than when it matches the higher NP. These, apparently contrasting, results are generally inter-
preted as showing an initial LA preferences followed by a later reanalysis for HA. Similar results
have been obtained in other languages (see e.g. Fernández 2003 for Spanish, Baccino et al.
2000 for French and Italian; Frenck-Mestre & Pynte (2000a,b); Pynte et al. (2003) for French;
Kamide & Mitchell (1997); Miyamoto (2005) in Japanese and Lourenço-Gomes et al. (2011) in
Portuguese). However, as Andrea Santi p.c. pointed out, this is only one possible interpretation
of the timing results. One, equally valid interpretation of (at least some of) the data is that longer
RTs for High Disambiguation are due to *intervention* effects, triggered by the similarity of in-
ternal structure of the target High-NP and the intervening Low-NP. This explanation would treat
the timing effects as a common case of *attraction* phenomena (Bock & Miller 1991; Franck et al.
2006, 2007, 2010, for a review and a discussion of the effects of attraction in comprehension see
Wager et al. 2009). Attraction effects occur also in the absence of ambiguity and crucially this

explanation does not require stipulating commitment to a parse followed by reanalysis. Preliminary empirical support for this interpretation, which we are currently investigating, can be found in Lourenço-Gomes et al. (2011). A similar claim is made in Miyamoto (2005), cited in Maia et al. (2006). (8) illustrates this point with manipulation of Number. A full paradigm involves crossing both local and non-local configurations (i.e. LA and HA) with the number specification.

(8) a. NON-LOCAL SING-PL-SING
         Someone shot the maid.SING of the actresses.PL that was.SING on the balcony
     b. NON-LOCAL PL-SING-PL
         Someone shot the maids.PL of the actress.SING that were.PL on the balcony
     c. LOCAL PL-SING-SING
         Someone shot the maids.PL of the actress.SING that was.SING on the balcony
     d. LOCAL SING-PL-PL
         Someone shot the maid.SING of the actresses.PL that were.PL on the balcony

On the basis of the attraction literature we can predict the non-local agreement configuration in (8-a) and (8-b) to be harder to process than the local configuration in (8-c,d). On the basis of the same literature, we expect (8-a) to be harder than (8-b). The results in Lourenço-Gomes et al. (2011), who tested the full paradigm above, support this prediction. Grillo et al. (2013b), who also manipulated PR availability, obtained similar results.

A thorough review of the online attachment literature is necessary to fully assess both the extent of the parallelism between early-attachment preference and *attraction*, i.e. to what extent is the former reducible to the latter, and the effects of PR-availability on online results. Much more work is needed on this asymmetry, since a proper assessment is complicated by the usual difficulty in accessing the original stimuli coupled with the great extent of variation in the type of disambiguation (e.g. semantic vs. grammatical gender, number, plausibility) and the position of disambiguation (early vs. late in the sentence) used across studies.

Individual variation. Finally, an interaction of reading span with attachment preferences was consistently obverved in both children Felser et al. (2003) and adults (Mendelsohn & Pearlmutter, 1999; Swets et al., 2007; Omaki, 2005). Somewhat surprisingly, these studies reported a preference for HA in participants with low reading span and a preference for LA in participants with high reading span.[4]

1.2. Previous accounts

Several accounts have been proposed to explain this complex patter of variation, e.g. the *Tuning Hypothesis* (Mitchell & Cuetos, 1991; Mitchell et al., 1995), *Construal* (Gilboy et al., 1995; Frazier & Clifton, 1996), *Predicate Proximity* (Gibson et al., 1996, 1999), *Anaphoric Binding* (Hemforth et al., 1998, 2000b,a; Konieczny & Hemforth, 2000), *Implicit Prosody* (Fodor, 1998a,b, 2002). A thorough discussion of these approaches is beyond the scope of this paper. Excellent critical reviews of this literature can be found in Fernández (2003) and Augurzky (2005).

Above and beyond the specific claims of the various accounts, which we'll summarize shortly, these works (and many other works produced to test their predictions) have made it clear that

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[4]Fraga et al. (2012) reported an offline effects of the emotional charge associated with nouns on RC attachment. Emotionally (both positive / pleasant, *orgasm* and negative / unpleasant *killer*) charged nouns appear to act as attractors for RC attachment.

several factors are ultimately involved in determining attachment preferences, including: lexical, prosodic, and frequency / recency of exposure to prior attachment resolution. It is important to underline that the findings presented here do not deny the relevance of these factors for the resolution of RC-attachment and certainly do not stand in opposition to previous accounts. One issue we will return to is that none of them has considered the potential role of PR-availability in RC-attachment.

The Tuning Hypothesis. The *Tuning Hypothesis* (Mitchell & Cuetos, 1991; Mitchell et al., 1995; Cuetos et al., 1996) proposes an explanations to the cross-linguistic asymmetry in RC attachment built around the idea that the frequency of exposure to High vs. Low attachment structures might be different across languages and individuals and that this difference might directly affect processing.

One advantage of the *Tuning Hypothesis* is that, in principle, it could easily accommodate both variation across languages (due to different statistical distribution of HA and LA across languages) and individual variation in attachment preferences (due to differences in individual exposure's to HA and LA in a speaker's past experiences). HA languages, therefore, are predicted to show a higher frequency of HA resolutions, while LA languages would show the opposite. See Cuetos et al. (1996) for corpus analyses of English and Spanish supporting this prediction. Mitchell & Brysbaert (1998), on the other hand didn't find a correlation between frequency of attachment and attachment preferences in Dutch, as LA appeared to be much more frequent (69%) than HA in the corpus they considered.

Effects of frequency in processing are well-known, but there's lack of agreement as to whether they can affect early stages of syntactic processing and at what level of granularity do they apply, i.e. do they apply at the sentence level, at the phrase level or do they involve lower level distinctions such as animacy or humanness? The latter was found to be essential in explaining attachment preferences in the analysis of Desmet et al. (2002a). Results from Gibson et al. (1996); Gibson & Schütze (1999), however, do not support the predictions of the Tuning Hypothesis as they found no direct relation between frequency and comprehension preferences, but see also Desmet & Gibson (2003).

The claim about individual variation and the relative frequency of exposure to HA and LA is obviously much harder, if not impossible, to test. One essential question, and one which often arises when looking at the relation between frequency distribution of a certain form and parsing preferences or complexity is whether it is the former that generate the latter or vice versa, i.e. that a form is less frequent because inherently more complex or less favored by the parser. This has often led to criticisms for the *Tuning Hypothesis*'s explanatory power.

More importantly, for the present discussion, is the fact that none of the corpus studies on attachment took into account the difference between Relative Clauses, in which attachment is indeed optional, and Pseudo Relatives, in which attachment is obligatorily high. A detailed, much needed, reevaluation of these studies at the light of this finding is far beyond the scope of this paper. On this issue, Marc Brysbaert, p.c. 2012 pointed out that the difference in RC-attachment between animate nouns (>HA) and inanimate nouns (>LA) observed by Desmet et al. (2002a) might be explained assuming that PRs can only occur with animate nouns, and that this be further evidence for the central role of PR-availability in influencing RC attachment. PRs, however, are available with both animate and inanimate NPs, e.g. *Ho visto il vaso che si spaccava per il freddo / I saw the vase break itself because of the cold*, but there seem to us to be a clear preference for PRs to be built with animate subjects. This possibly stems from the fact that subjects of PRs have to undergo some kind of perceivable change of state or displacement,

e.g. *Ho visto la pietra che cadeva / I saw the stone falling*. A proper assessment of the role of PRs in this pattern would require reanalyzing the relevant corpora to see whether the RCs under consideration could also be interpreted as PRs, and whether there was a difference in their internal structure when attached to animate or inanimate NPs (e.g. were inanimate NPs modified by stative *the vase that had been broken* or eventive *the vase that was being broken* RCs); see section 2.1 for discussion of these differences.

Construal. Gilboy et al. (1995); Frazier & Clifton (1996) propose a modification of the *Garden-Path model* which takes into account the distinction between *primary* and *non-primary* relations. Structural parsing principles, i.e. Minimal Attachment and Late Closure (Frazier, 1978, 1987), apply to primary relations, such as verb-argument relations.

(9)   Primary phrases and relations include: (a) the subject and main predicate of a (+ or -) finite clause; (b) their complements and obligatory constituents; and (c) complements an obligatory constituents of primary phrases.[5]

Non-primary relations, e.g. the adjunct relation between NPs and Relative Clauses, are not governed by the parser in the same way as arguments, but they are *construed*, i.e. associated to the current thematic processing domain in accordance to a variety of non-structural principles.

(10)   *Construal Principle*
Associate XP, where XP cannot be a primary phrase, into the current processing domains - the extended maximal projection of the last thematic role assigner.

Restriction of construal to the current thematic processing domain (intended as the extended maximal projection of the last theta assigner encountered in the sentence) explains LA preference in the presence of the thematic preposition *with* illustrated above (De Vincenzi & Job, 1993, 1995; Gilboy et al., 1995, a.o.).

In contrast to structural principle, which are blind to any non-syntactic factor, Construal takes into account pragmatic and discourse representation factors. In the presence of multiple attachment sites, for example, a *Referential Principle* (12) favors construing a restrictive RC with *referential* elements, e.g. *the shirt*, as opposed to *cotton*, in (11); the presence of a Determiner being one of the diagnostics for referentiality.

(11)   Yesterday they gave me the sweater of cotton that was illegally imported.

(12)   *Referentiality Principle*
The heads of some maximal projections are "referential" in the sense that they introduce entities (e.g. discourse participants) into the discourse model (at least temporarily) or correspond to already existing discourse entities. Restrictive modifiers (e.g. restrictive relative clauses) preferentially seek hosts that are referential in this sense. (Gilboy et al., 1995, p.136)

Similarly, Gilboy et al. propose that another pragmatic principle, the Gricean maxim of clarity (Grice, 1975), coupled with a grammatical difference between English and Spanish plays

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[5]Gilboy et al. (1995), p. 133, specify that "*a primary phrase relation is the main subject-predicate relation of any clause that is marked + or - finite (thus not including "small clauses")*". Notice that this proviso does not include the relation between the subject and predicate of Pseudo Relatives, as this type of Small Clauses are +finite.

a crucial role in explaining the cross-linguistic variation in attachment. English, but not Spanish, allows for complex NPs to appear in two forms: the prepositional (*N1 of N2*) and the genitive (*N2's N1*). Crucially, RC attachment ambiguity disappears in the presence of the genitive form, and attachment to N1 is forced: *the actress$_2$'s maid$_1$ who$_{1/*2}$ was on the balcony*. Having access to an unambiguous option to express HA, English speakers would be expected, because of the Gricean maxim of clarity, to resort to the prepositional option to express LA. Spanish speakers, on the other hand, do not have such a choice, and therefore do not show a propensity for LA in their only available option (the prepositional).

Experimental results presented in Gilboy et al. (1995) strongly supports both effects of thematic domain and referentiality on attachment. The alleged effects of the Gricean maxim of clarity postulated in the *Construal* approach, however, are not fully supported by cross-linguistic results. Based on this account, we would expect i. LA preference to arise with languages that, like English, allow for an alternative genitive form, which has been shown not to be the case for e.g. Greek (Papadopoulou & Clahsen, 2003), Dutch and Afrikaans (Mitchell et al., 2000) and Croatian (Lovrić, 2003); *and* ii. HA preference in languages lacking the alternative genitive form, which is not universally true, see (Ehrlich et al., 1999) on Romanian.

Predicate Proximity. On the basis of the U-shaped attachment preference observed in 3-NP contexts, Gibson et al. (1996, 1999) proposed an explanation to cross-linguistic variation as the product of the interaction of principles of *Recency* (13), a principle akin to *Late Closure*, with Predicate Proximity (14), an extension of the *Relativized Relevance* principle proposed by Frazier (1990).[6]

(13)   *Recency*
       Preferentially attach structures for incoming lexical items to structures built more recently
       (Gibson et al., 1996, p.26)

(14)   *Predicate Proximity*
       Attach as close as possible to the head of a predicate phrase.
       (Gibson et al., 1996, p.41)

(14) recognizes the central role played by predicates in structuring sentences, Gibson et al. hypothesize that "*the core predicate structure (i.e. the predicate and its argument) is ranked more highly for attachment by the parser*", i.e. are preferred in cases in which multiple attachment sites are available.

To explain cross-linguistic variation in attachment in 2-NPs contexts, Gibson et al. propose that Predicate Proximity is subject to parametrization, and is weak in English but strong in Spanish. This assumption is based on the relative degree of freedom in word order in a given language, in languages with relatively free word order (like Spanish, French and German) the predicate plays a more central role in parsing than in languages with relatively fixed word order like English.

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[6]Relativized Relevance: *Other things being equal (e.g. all interpretations are grammatical, informative, and appropriate to discourse), preferentially construe a phrase as being relevant to the main assertion of the current sentence.*
A difference between Relativized Relevance and Predicate Proximity is that the former was intended to apply *after* Late Closure, while the latter is taken to be in direct competition with *Recency*. On Relativized Relevance and adjunct attachment see also Traxler & Frazier (2008).

The strength of *Predicate Proximity* in Spanish would explain the HA preference in 2-NP sites in this language, while its relative weakness in English would account for the observed LA preference. The increased distance between the predicate and the RC, would in turn account for the identical non-monotonic preference in the two languages, i.e. increasing the distance lowers the strength of *Predicate Proximity* over *Recency*. In section 3.2.2, after discussing the role of PRs in determining attachment preferences, we will provide an analysis of the cross-linguistic variation which does not require postulating the parametrization of principles such as *Relativized Relevance / Predicate Proximity*.

Anaphoric Binding. The *Anaphoric Binding* account (Hemforth et al., 1998, 2000b,a) focuses on the cross-linguistic difference in how RCs are introduced. In some languages, e.g. German, RCs are necessarily introduced by relative pronouns, while in others, e.g. English, not only pronominal elements (*who*) but also complementizers (*that*) or even null elements can alternate in introducing RCs. Since pronominals tend to be interpreted as referring to salient discourse antecedents, we can expect to find a strong effect of saliency in the interpretation of RCs (or adverbial clauses containing a pronominal, e.g. *when he was in the house*). Given that NP1 in the complex NPs discussed here, is generally associated to the matrix clause, and thus more salient than NP2, a preference for HA can be predicted for RCs in languages in which these are obligatorily introduced by a relative pronoun.

The presence of a relative pronoun, in some languages, explains the difference between RC attachment, predicted to be consistently high in these languages, and PP attachment, which has been shown to be universally low. The *Anaphoric Binding* approach, thus, is successful in explaining the difference between PP attachment, on the one side, and RC and Adverbial clauses on the other. Problems arise when more languages are considered, and in particular when the behavior of HA languages in presence of an optional relative pronoun is taken into account. Fernández (2003), p. 31, discusses how replacing the complementizer *que* with relative pronouns *el cual* in Spanish produces a sharp change in attachment preference from High to Low, against the predictions of *Anaphoric Binding*. Other languages with obligatory relative pronouns in the context of RCs appear to behave as predicted by the approach, e.g. Russian, while others, e.g. Bulgarian, have given mixed results.

This approach, therefore, explains variation in RC attachment across languages as the consequence of the interaction of a grammatical distinction, the obligatory presence of a relative pronoun in RCs, with the contextual saliency difference between NPs which are part of the main assertion of the sentence (which act as attractor for binding) and those that are not.

Implicit Prosody. Several experiments have shown that varying the length of the NPs and / or that of the RC strongly influences RC attachment in complex NPs (Pynte & Colonna, 2000; Fernández, 2003; Lovrić, 2003; Wijnen, 2004; Quinn et al., 2000; Augurzky, 2005). HA preference arises with long RCs (15-a), while short RCs tend to be attached low (15-b)

(15) a. This is the son of the doctor who runs several marathons a year
     b. This is the son of the doctor who runs

A number of other studies in different languages has found that the presence of a prosodic break before the RC strongly influences speakers to attach high Lovrić & Fodor (2000); Lovrić et al. (2001); Lourenço-Gomes (2005).

Fodor (1998a,b, 2002) proposed that these effects are expected if we assume that a default prosodic contour is projected while reading, and this prosodic representation is able to influence

the syntactic choices of the parser.

(16)   *The Implicit Prosody Hypothesis, IPH*
       In silent reading, a default prosodic contour is projected onto the stimulus, and it may
       influence syntactic ambiguity resolution. Other things being equal, the parser favors
       the syntactic analysis associated with the most natural (default) prosodic contour for the
       construction.   (Fodor, 2002, p.113)

Intonational boundaries are more likely to precede longer RCs than shorter RCs, because speak-
ers (and listeners / readers) prefer projecting independent intonational phrases for long RCs,
while they are more likely to dislike intonational phrases composed of short stand-alone RCs.
The presence of a phrase boundary , in turn, creates a HA bias for longer RCs.

Besides accounting for the differences in attachment due to relative length of the constituent,
or the presence / absence of a prosodic break before the RC, the IPH was claimed to be able
to account for the cross-linguistic variation in attachment. Variation across languages might be
explained as the by-product of variation in prosodic phrasing imposed by the different grammars
of those languages, i.e. speakers of different languages attach differently because their grammar
projects different prosodic contours over similar stimuli (see Jun 2003 for evidence in favor of
this account). A proper assessment of the IPH in the light of the present findings is beyond the
scope of this paper. See section 3.3 for a short discussion of possible confounding factors intro-
duced by PR-availability.

Most of the accounts introduced above were initially designed to deal with variation in at-
tachment preferences, but they quickly expanded and generalized to accommodate a variety of
phenomena (often very successfully). Despite their success in explaining much variation in at-
tachment preferences, but have stumbled over a number of problems and roadblocks.
While there is no agreement over which account offers a better explanation of the observed vari-
ation, there is substantial agreement that *no account* proposed so far manages to deal with the
full extent of this variation, i.e. a residual variation across languages and structures is still in
need for an explanation. More importantly, for our present purposes, *no account* proposed so
far recognized that the languages and structures under scrutiny differ in allowing / disallowing
the Pseudo Relative Small Clause structure discussed in the following paragraph. Moreover, the
asymmetric availability of PRs, is a confound present in all the experiments that either allegedly
supported or falsified them. All accounts, therefore, should be reappraised at the light of the
present finding.
It is possible that some or all of the problems faced by the accounts reviewed above might turn
out to be epiphenomenal once the role of PRs is recognized and properly taken into account. This
reappraisal is beyond the scope of the present work, but future discussion of these accounts and
the data in support and against them will have to take into account the PR-confound. We hope
the recognition of the role of PRs in attachment will free the theories they have generated from
the burden of explaining the residual variation.

In the next section we introduce the PR / RC distinction and attempt to reorder previous
findings at the light of this distinction. While more investigation is certainly needed to properly
appraise the role of PR-availability in attachment preferences, we'll show that a much more
organic picture emerges once this cross-linguistic difference is taken into account.

2. Not all Complementizers are created equal

A standard assumption in the literature on RC attachment is that the syntactic structures under consideration, both across languages and structure, are equivalent in all the relevant respects, i.e. instances of Relative Clauses embedded within a complex DP.[7] (17) (a) and (17) (b) are treated as equivalent and both two way ambiguous. Assuming identity at the grammatical level necessarily puts all the burden of explanation of the existing variation on the parser, and generates the problems mentioned above for a theory of universals in parsing.

(17)   a.   I saw the son of the doctor that was running
          b.   Vi al hijo del medico que corría

The underlying assumption is that English *that* and Spanish (or Italian / French / Dutch) *que / che / qui / die* are essentially equal in their function. Importantly, however, this assumption is wrong: the syntactic properties of English *that* are not the same as those of Italian *che* or Spanish *que*. Complementizers, like Prepositions, are a domain of extreme and often subtle variation across languages (with respect to e.g. subjacency effects, *that*-trace effects etc.) and a careful analysis of their combinatorial properties will reveal that even superficially similar and homophonous Cs like the Italian, French and Spanish *che / que* reveal important differences in their structural distribution.

These distinctions become particularly relevant in the context of complex DPs. In the case at hand, while the English (18) is two-ways ambiguous in that the RC introduced by *that* can be attached both to NP1 and NP2, its "counterpart" in Spanish (19), however, is three-ways ambiguous. As in the English sentence, *que* can introduce a RC attaching either to NP1 or NP2, but in addition to the RC, it can also introduce a Pseudo Relative Small Clause which attaches to VP and obligatorily takes NP1 as its subject.

(18)   I saw the son of the doctor that was running

(19)   a.   Vi al $[_{DP}$ $[_{NP1}$ hijo del medico] $[_{CP}$ que corría]]
          b.   Vi al $[_{DP}$ hijo [del [medico $[_{CP}$ que corría]]]]
          c.   Vi al $[_{SC}$ $[_{DP}$ hijo$_1$ del medico$_2$] $[_{CP}$ que EC$_{1/*2}$ corría]]
              I saw the son of the doctor running

Pseudo Relatives are a particular type of clausal complement that, despite their name, have little to nothing in common with Relative Clauses. They are selected by a restricted set of verbs, most typically by e.g. verbs of perception (e.g. *see* above) and roughly correspond to English *Acc*-ing constructions, as the gloss to (19-c) indicate.

Since the asymmetry between RCs and PRs was never recognized in the preceding literature on RC attachment, and given the central role that this literature played in the more general discussion regarding modeling of the human language parser, it is very important to consider in some details the potential consequences of this asymmetry.

Given the size and scope of the literature on RC attachment, a full and fair assessment of these consequences clearly lies beyond the scope of the present paper. However, we hope to provide enough evidence, from both previous results and novel data from two experiments in Italian in

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[7]Obviously we are abstracting away from both the difference between Complementizers and Relative Pronouns (Hemforth et al., 1998, 2000b,a), and the role of Referentiality and type of relation between the NPs analyzed in Gilboy et al. (1995).

support of the claim that the availability of Pseudo Relatives plays a crucial role in resolving attachment ambiguities, as demonstrated by our two experiments, and cannot be ignored further. Before getting into any of this, however, it is important that we provide a clear characterization of the structure under discussion. The following section introduces some fundamental syntactic and semantic properties of Pseudo Relatives, discussing in particular how they differ from Relative Clauses and their essential similarity with (eventive) Small Clauses in English.

2.1. Pseudo Relatives

Pseudo Relatives (PR) and RCs are string identical, but they differ drastically in their structural and semantic properties:[8]Several analyses of PRs have been proposed; importantly for us, they all recognize these fundamental differences between PRs and RCs. For concreteness, we assume Cinque's (1992) analysis throughout. Cinque proposes a Small Clause (SC) account of PRs (parallel to Declerck's (1981) tripartite analysis of Small Clauses), which, among other advantages, offers a straightforward explanation of the ability of PRs to appear in all contexts in which SCs appear. We will assume this to be essentially correct for Italian[9]; nevertheless, the availability of PRs across languages, and often across speakers (e.g. in European Portuguese), varies considerably.

As Cinque (1992) discusses in details, PRs share crucial structural and semantic properties with English Small Clauses of the *Acc*-ing type. Just like English SCs, PRs denote events / propositions and are subjected to a number of semantic and syntactic restrictions, which do not apply to RCs (which denote entities). In this section we briefly summarize these asymmetries.
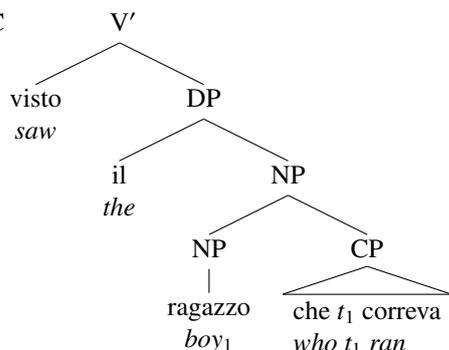
(20) illustrates the difference between the PR and RC interpretation of the same string, the translation in (20-b) corresponds to the RC interpretation of (20-a), the PR interpretation is illustrated in (20-c). The two structures are displayed side by side in (21). Crucially, in (20-b) the main verb takes a DP as its complement and the RC modifies that DP; at the interpretive level this is mapped as the perception of an entity/individual having certain additional restrictions specified in the RC. In (20-c), on the other hand, the matrix verb takes the whole Pseudo Relative Small Clause as its complement, and the DP is the subject of that clause; at the semantic level, we are reporting the perception of an event.

(20) a. Ho visto il ragazzo che correva
      b. Ho visto [$_{DP}$ il [$_{NP}$ ragazzo [$_{RC}$ che correva]]]
          I saw [the [boy [that ran]]]
      c. Ho visto [$_{SC}$[$_{DP}$ il ragazzo] [che correva]]
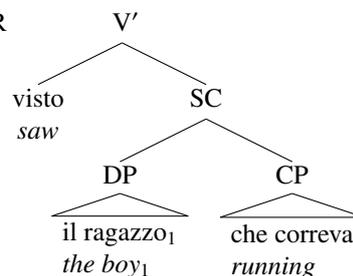   I saw [[the boy] [running]]

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[8]On Pseudo Relatives see: Radford (1975); Graffi (1980); Burzio (1981, 1986); Kayne (1981); Taraldsen (1981); Declerck (1981, 1982); McCawley (1981); Auwera (1985); Guasti (1988, 1992, 1993); Rizzi (1992); Raposo (1989); Cinque (1992); Barros de Brito (1995); Labelle (1996); Rafel (1999); Côté (1999); Koenig & Lambrecht (1999); Koopman & Sportiche (2010), among others. Most examples in this section are taken from the literature review in Cinque (1992).

[9]As Ad Neeleman (pc. 2012) pointed out, this is not literally true as PRs are not available in the SC's context of *consider* type of predicates (*Considero Gianni che è un bravo scrittore / I consider Gianni that he is a good writer*). Notice that this restriction also holds for semantically homologues of PRs across languages, e.g. Acc-ing constructions in English and Spanish: *I consider John being a good writer / Considero Juan siendo un buen escritor* and Prepositional Infinitive Constructions in Portuguese (*Considero o João a ser um bom escritor*). The restriction possibly relates to the eventive nature of PRs, PICs and Acc-ing constructions which clashes with the stative properties of consider type verbs and has consequences for a theory of SCs, which should distinguish between the stative type allowed with *consider* (Considero Gianni un bravo scrittore/ I consider Gianni a good writer) and the eventive PR type.

(21) a. RC V′

visto / *saw*   DP

il / *the*   NP

NP   CP

ragazzo / *boy[1]*   che t_1 correva / *who t_1 ran*

b. PR V′

visto / *saw*   SC

DP   CP

il ragazzo[1] / *the boy[1]*   che correva / *running*

Just like other types of clausal complements, PRs are generally selected by a subset of predicates. Perceptual verbs (*see, hear, feel* etc.) are the most typical example, however, just like English SCs, PRs can also freely appear with non-percepual verbs.[10]

(22) a. Ho incontrato Gianni che correva
        I met John running
    b. Ho beccato Gianni che rubava
        I caught John stealing
    c. Ho trovato Gianni che cenava con Maria
        I found John having dinner with Mary

As mentioned, Cinque (1992), following Declerck (1981), argues convincingly that PRs, like SCs of the Acc-ing type, come in 3 different varieties: PR arguments of V (23-a), PR adjunct within NP (23-b) and PR adjunct of VP (23-c): (original examples from Cinque 1992, ex. 38 p. 9)
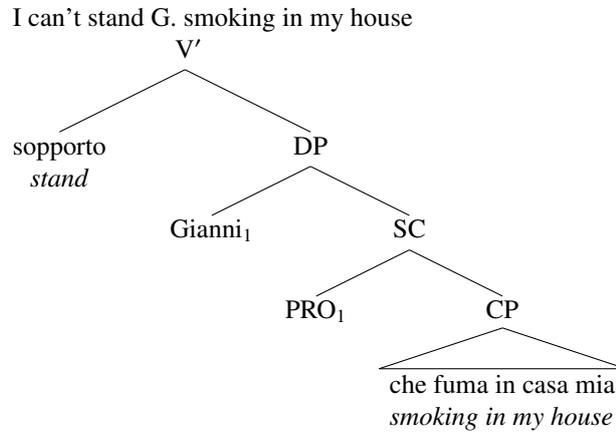
(23) a. Small Clause complement:
        Ho [$_{V'}$ visto [$_{SC}$ Mario [che correva a tutta velocità]]]
        I saw Mario that was running at full speed
    b. Small Clause adjunct within NP:
        Ho [$_{V'}$ visto [$_{NP}$ [$_{NP}$ Mario] [$_{SC}$ PRO [che correva a tutta velocità]]]]
    c. Small Clause adjunct within VP:
        Ho [$_{VP}$ [$_{V'}$ visto Mario [$_{SC}$ PRO che correva a tutta velocità]]]

Each of these structures correspond to a different semantic interpretation (see below) and, importantly, not all PR taking verbs allow all the structures in (23); i.e. not all PR-verbs allow for the PR complement analysis in (23-a). All PR taking verbs, however, allow for at least the adjunct interpretation. The two types of structural relations are depicted in the trees in (24) and (25).

(24) *PR adjunct within NP*
    Non sopporto Gianni che fuma in casa mia
    Neg. stand.1ST SING G. that smokes in house mine

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[10]PR-verbs include e.g. *incontrare / meet, acchiappare / catch, trovare / find, sognare / dream, immaginare / imagine, scoprire / discover, imitare / imitate, mimare / mimic, riconoscere / recognize*, among others. PR, and Acc-ing SCs, also appear in a variety of other contexts, e.g.: *Ecco Gianni che arriva / Here is G. that arrives, Non sopporto G. che fuma / I can't stand G. smoking*, see Cinque (1992) for a more comprehensive list.

I can't stand G. smoking in my house

```
                    V′
           ╱              ╲
      sopporto            DP
       stand         ╱         ╲
                  Gianni₁        SC
                            ╱        ╲
                         PRO₁         CP
                                 ╱        ╲
                            che fuma in casa mia
                            smoking in my house
```

(25) *PR adjunct within VP*
Ho incontrato Gianni che correva
have.1ST SING met G. that ran
I met G. running

```
                 V′
         ╱              ╲
    incontrato          V′
       met         ╱          ╲
                  DP           SC
                Gianni₁    ╱        ╲
                        PRO₁         CP
                                ╱        ╲
                           che correva
                           running
```
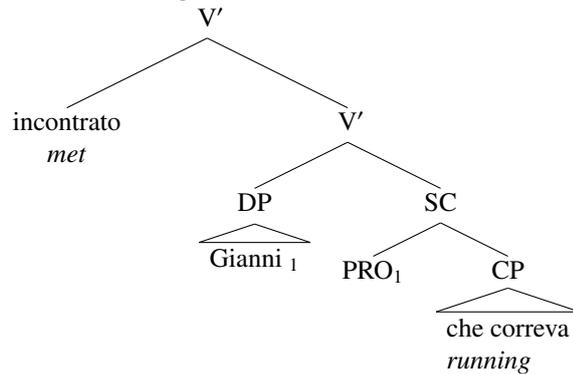
The examples in (24) and (25) also illustrate one property that clearly distinguishes PRs (and English SCs) from RCs is that the former, but not the latter, can freely occur with proper names. With the irrelevant (for the present purposes) exception in which they behave like nouns (26), proper names cannot be modified with restrictive RCs.

(26)   Which Mary are you talking about? I mean the Mary who came from Alabama.

Notice also that in these exceptional cases, an overt determiner is often required. (27-a-c) further illustrates this property of PRs in Italian, Spanish and French, (27-d) shows that the same string is ungrammatical in English (notice that a long break between *John* and *ran* might well make the sentence acceptable, this *appositive* reading, however, is not what we are after and is also independently available in the other languages under discussion), (27-e) finally illustrates English Small Clauses of the Acc-ing type, which match PRs interpretation.

(27)   a.   Ho visto [PR Gianni / il ragazzo che correva]
        b.   He visto a [PR Juan / el chico que corría]
        c.   J'ai vu [PR Jean / le garçon qui courait]

16

548   d.   *I saw John that ran

549   e.   I saw [$_{SC}$ John running]

550 The proper name in (27) prevents the embedded clause to be interpreted as a RC modifier, forcing
551 a PR reading of the whole segment (*Gianni che correva / John running*).

552   In the environment of perceptual verbs, complement PRs behave just like complement Small
553 Clauses: they project as complements of the matrix V taking the apparent object DP as their
554 subject and are interpreted as propositions.

555 (28)   a.   Ho   visto Gianni che correva
              have-1ST SING seen Gianni that ran
556   I saw Gianni running
557   b.   Ho   visto che Gianni correva
              have-1ST SING seen that Gianni ran
558   I saw that Gianni ran

559 (28-a) is interpreted as reporting the direct perception of an undergoing event: *I saw an event of*
560 *John running*. Direct perception is the fundamental distinction between (28-a) and (28-b); the
561 latter but not the former would still be true in a context in which the content of the embedded
562 clause had been inferred (from e.g. having discovered that Gianni won some running trophy).
563 The same interpretive difference emerges in the English *Acc*-ing constructions, as the translations
564 to the examples above clearly show.

565 *Events vs. entities.* (29) and (30) illustrate the semantic distinction between PRs and RCs, while
566 DPs modified by RCs denote individuals / entities, PRs denote propositions / events[11] :

567 (29)   PSEUDO RELATIVE / SMALL CLAUSES COMPLEMENTS
568   Gianni ha visto [$_{PR}$ la ragazza che correva]
569   John saw [$_{SC}$ the girl running]
570   ∃s ∃s' [see(s) & AGENT(s)(John) & THEME(s')(s) & run(s') & AGENT(s')(the girl)]
571   There is an event of seeing and the agent of that event is John and the theme of the event
572   is an event of running and the agent of running is the girl / Alternatively: There is some
573   event s', which is an event of a girl running, and there is an event s which is an event of
574   John seeing s'.

575 (30)   RELATIVE CLAUSES
576   Gianni ha visto [$_{DP}$ la [$_{NP}$ ragazza [$_{CP}$che correva]]]
577   John saw the girl that was running
578   ∃s [see(s) & AGENT(s)(John) THEME(the unique girl that ran)(s)]
579   There is an event of seeing and the agent of that event is John and the theme of the event
580   is the unique girl that ran

581 The PR-complement interpretation (29) reports the perception of an event, i.e. the theme of *see* is
582 an eventuality: THEME(s')(s), s = an eventuality (of the running type); the RC interpretation in (30)

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[11]The same is true for SCs in English, as the translations show. Everything we'll say about PRs also applies to SCs
of the *Acc*-ing type, for ease of presentation from now on we'll simply refer to the former, glosses and translations to
the examples however clearly show this correspondence. Similarly, when we talk about SCs we are referring to the
"*eventive*" *Acc*-ing type (i.e. not to SCs of the "stative" type, such as *I [consider [$_{SC}$Mary smart]]*)

reports the perception of an entity, i.e. the theme of *see* is an ordinary individual: THEME(x)(s), x = an individual (the girl). The PR-adjunct within VP parse derives a very similar (though not identical) interpretation in which importantly the embedded event also has to unfold within the same temporal window of the matrix event. For example: *Ho incontrato la ragazza che correva / I met the girl running* requires the meeting event and the running event to overlap in time, i.e.: *I met the girl while she was running*. The PR-adjunct within NP parse, on the other hand, is recognizable as imposing a temporal modification on the NP itself. For example: *Non sopporto Gianni che fuma / I can't stand John smoking*, does not have either the restrictive *the one G. that smoke* nor the appositive *I can't stand John, who smokes*; but rather means that I can't stand John *when* he is smoking. This is similar to other types of adverbial NP-modifiers, e.g.: *Non sopporto Gianni vestito da boy scout / I can't stand J. dressed as boy scout*, which

The difference between PRs and RCs is clear, especially once we consider that the RC interpretation in (30) is true even if John didn't actually see the girl run (or didn't meet her while she was running), all that is required is that the girl that John saw did run at some point in time, cf. (31):

(31)   Domani Gianni vedrà la ragazza che ha corso la maratona di beneficenza ieri RC / *PR
        Tomorrow John will see the girl that ran.PERFECTIVE the charity marathon yesterday.

(31) is a perfectly fine sentence even if it is clearly not possible to perceive tomorrow an event which took place last week. (31), however, cannot be interpreted as a PR, due to the temporal (and aspectual) mismatch between the matrix and the embedded clause (see below). Notice that this is obviously true also of strings that are ambiguous between a reduced RC and a SC, which can be disambiguated (creating an interesting garden path effect) by mismatching the Tense in the matrix verb with a temporal modifier in the embedded clause and thus forcing the reduced RC reading:

(32)   I saw the girl dancing at the gala tomorrow   RC / *SC
        = I saw the girl that will be dancing at the gala tomorrow

Arguably, (32) is hard to parse because it is originally projected as a SC, this reading, however, is incompatible with the temporal mismatch and the parse needs to be revised.

The contrast in (33) and (34) makes use of the difference between animate (chi / who) and inanimate (ciò) pro nominals further illustrate this semantic difference between RCs and PRs. Entities, in fact, can obviously be both animate or inanimate. Events, on the other hand, cannot be interpreted as animate, which means that they can only be referred to with inanimate pronominals.

(33)   a.   Chi$_i$ ho   visto è [$_{DP/*PR}$ il ragazzo$_i$ che correva]
                Who have-1stp.sing. saw is the   boy   that ran
              Who I saw is the boy that ran
        b.   *Chi ho   visto è Gianni che correva
                Who have-1stp.sing. saw is Gianni that ran
              *Who I saw is John running
        c.   Chi$_i$ ho   visto è [$_{DP/*PR}$ il Gianni$_i$ che correva]
                Who have-1stp.sing. saw is the   Gianni   that ran
              Who I saw is the John that ran

18

The animate *wh*-pronoun *chi / who* in (33-a,b) can obviously only be used to refer to an animate entity. In (33-a), *chi / who* is free to refer to *il ragazzo / the boy*, an animate entity modified by the RC *that ran*. (33-a) and (33-b) are minimally different: a proper name (Gianni) replaced the definite description *the boy*. (33-b), however, is completely unacceptable, even if a potential animate referent is present in the clause (i.e. Gianni). As explained above, the proper name prevents the embedded clause to be interpreted as a RC modifier and forces a PR reading. The ungrammaticality of (33-b) is generated by the impossibility of simultaneously satisfying two conflicting requirements: i. the animate pronoun, rules out a PR parse by requiring the object of see to be an animate DP; and ii. the proper name rules out a RC reading and forces a PR parse, in which the complement of see is obviously an inanimate event. In this structure, the matrix verb (*see*) takes the whole embedded clause (*Gianni che correva / John running*) as its complement, i.e. *I saw an event of John running* denotes an event and not an animate entity. This is why we can't refer to it with the animate *chi / who*.

The exact opposite pattern emerges once we replace the animate pronominal with an inanimate one: *ciò / what* in (34-c,d) can only refer to inanimate referent. The only inanimate referent available is the whole clause "*Gianni che correva*", which forces it to be interpreted as a PR. As the glosses to (34-b) indicate, this is not a quirk due to the presence of a proper name: even with NPs that would otherwise accept a RC (*the boy*) a SC reading is the only available option.[12]

(34)   a.   Ciò$_i$ che ho   visto è [$_{PR/*RC}$Gianni che correva]$_i$
                What that have-1stp.sing. saw is Gianni   that ran

            What I saw is Gianni running

       b.   Ciò$_i$ che ho   visto è [$_{PR/*RC}$ il ragazzo che correva]$_i$
                What that have-1stp.sing. saw is the
                                                          boy   that ran

            What I saw is the boy running / *that ran

This contrast further shows that the string "*Gianni che correva*" is a constituent, which can be replaced with an inanimate pronoun and also Clefted (35-a) and Topicalized (35-b):

(35)   a.   È Gianni che correva che ho visto <Gianni che correva>!

            It is John running that I saw

       b.   Gianni che corre dovresti vedere <Gianni che corre> John that runs you should see

(36)   a.   [$_{PR/*RC}$ Gianni e Mario che corrono]$_i$ è$_i$ un evento da non perdere

            John that runs is an event not to miss

            John running is an unmissable event

       b.   C'è una cosa$_i$ che non sopporto, [$_{PR/*RC}$ Gianni e Mario che mi fumano in faccia]$_i$
            (Cinque, 1992, ex. 39, p. 10)

            There's one thing that I can't stand, Gianni and Mario that smoke in my face

            There's one thing that I can't stand, Gianni and Mario smoking in my face

       c.   Ho visto [$_{PR/*RC}$ Gianni che correva]$_i$, il che$_i$ mi ha sorpreso

            I saw Gianni that ran, which surprised me

            I saw Gianni running, which surprised me

       d.   [$_{PR/*RC}$ Gianni e Mario che mi fumano in faccia]$_i$ proprio non lo$_i$ sopporto.

            Gianni and Mario that smoke in my face, I really cannot stand it.clitic.sing

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[12]This is a good test to distinguish Complement from Adjunct PRs: as the sole NP is the complement of V in adjunct PRs, reference with inanimate *coò* is not allowed (except in the irrelevant cases in which an inanimate object is used): **Ciò che ho incontrato e' Gianni che correva / *What I met is John running*.

19

Notice in each of the examples in (36) the agreement mismatch between the plural *Gianni and Mario* and the singular marking on matrix copula *è, una cosa.* the propositional *pro*-form *il che* and the clitic *lo*, which shows that the subject of the matrix clause is the whole PR (a singular event) and not the coordinated DP.

Several other syntactic and semantic tests can be applied to show the fundamental differences between PRs and RCs. In the remainder of this section we discuss a few of these crucial distinctions. In the discussion that follows we'll often use proper names to ensure that we are dealing with a PR and not with an RC, however, as the examples above show PRs are perfectly available with other types of DPs (e.g. the boy). Syntactically, the differences between RCs and PRs are extremely clear, among others:

i. Just like SCs, PRs cannot be construed with objects and are only available with embedded subjects (37-a), this restriction obviously doesn't apply to RCs (37-b,c):

    (37)   a.   *Luigi ha visto [$_{PR}$ Gianni$_i$ che Maria baciava EC$_i$]
                  Luigi saw Gianni that Maria kissed EC
                  cf. *Luigi saw John Mary kissing EC
            b.   Luigi ha visto [$_{textscdp}$ il ragazzo [che <ragazzo> ha baciato Maria]]
                  Luigi saw the boy that <boy> kissed Mary
            c.   Luigi vive con il ragazzo che Maria ha baciato <ragazzo>
                  Luigi lives with the boy that Mary kissed <boy>

In SCs and PRs, what appears to be the direct object of the matrix clause is the subject of the embedded clause. The interpretation as object of the SC is therefore banned. This restriction holds for all types of SCs.

ii. In PRs, but not in RCs, the matrix event and the embedded event are interpreted as unfolding within the same temporal window. For these reasons the formers are subject to strict restrictions in Tense and Aspect: Tense marking in PRs have to obey strict requirements imposed by the Tense expressed in the matrix verb (38-a),[13], have to occur in the imperfective form (38-b) and more generally are restricted to undergoing events and cannot denote properties (38-c). This last restriction parallels the requirement for these type of SCs to appear in the progressive form in English, as progressive provides the required imperfectivity[14]. The example in (38-a) illustrates the case of temporal mismatch, the sentence reports an event of *seeing* which happened in the past and the THEME of this event is an event of *Gianni running*, which is marked with a future tense, the result is clearly meaningless and totally ungrammatical. The corresponding RC form (38-b), is obviously perfectly well-formed, since here the THEME of the matrix event is the individual "*the boy who will run*". (38-c) is ungrammatical because it reports the perception of a state (Gianni being home) as the consequence of an event which can only be inferred (running) and as

---

[13]Tense-maching does not involve strict *identity* of Tense. In certain contexts, for example, it's possible to have PRs in the presence of *future* Tense marking on the matrix verb (*Domani vedrò Gianni che corre / Tomorrow I will see John that runs*), for the PR reading to survive, however, the embedded verb has to appear in the *present* and not the future. Thus PRs in Italian have to appear in the imperfective when the matrix T is past and in the present in all other cases.

[14]The same progressive form is found in a variety of other languages, including some varieties of Brazilian Portuguese, Spanish and several dialects of Italian, e.g. Sardinian, see also Casalicchio 2013 for an excellent recent discussion of these different forms in Northern Italian dialects

such cannot be reported as being directly perceived. The RC version (38-d) is obviously acceptable as the perception of an individual is reported. (38-e) refers to a property of the individual Gianni, i.e.his knowledge of English, which, seemingly, cannot be directly perceived but only inferred, which excludes the PR reading and requires the use of indirect perception forms: *I saw that John knows English*. Once again the RC version of this clause (38-f) is perfectly acceptable.

(38) a. *Ho visto [_PR_ Gianni che correrà]
          I saw.PAST Gianni that run.FUT
      b. Ho visto [_DP_ il ragazzo [che correrà]]
          I saw/PAST the boy that run/FUT
      c. *Ho visto [_PR_ Gianni che è corso a casa]
          I saw Gianni that ran.PERF home
      d. Ho visto [_DP_ il ragazzo che è corso a casa]
          I saw the boy who ran home
      e. *Ho visto [_PR_ Gianni che conosce l'Inglese]
          I saw Gianni that knows English
          I saw G. knowing English.
      f. Ho visto [_DP_ il ragazzo che conosce l'Inglese]
          I saw the boy who knows English

iii. PR occur with C-elements such as *che / que / qui* but not with genuine Relative Pronouns which are restricted to RCs;

(39) *Ho visto Gianni il quale correva
      I saw Gianni that_REL-PRO ran

iv. While RCs modify NPs, and as such can appear in any environment in which NPs can appear, PRs are selected by a subset of predicates and therefore appear in a much more restricted set of contexts:

(40) a. Ho incontrato il ragazzo che correva   PR / RC
          have.1ST.SING met the boy that ran
          I met the boy running
      b. Vivevo con il ragazzo che correva   RC only
          lived.1ST.SING with the boy that ran
          I lived with the boy (that was) running

v. PRs freely occur in all contexts which select *eventive* SCs (see Cinque, 1992, ex. 23-30 for a full list):

(41) ADJUNCT SCs PREDICATED OF AN OBJECT
      a. Mangiò la pizza [_SC_ PRO [calda]]
          He ate the pizza hot
      b. Mangiò la pizza [_SC_ PRO [che stava ancora fumando]]
          He ate the pizza that it was still smoking

21

(42) ADJUNCT SCs PREDICATED OF A SUBJECT

    a.   Gianni lasciò la stanza [$_{SC}$ PRO [ubriaco]] G. left the room drunk

    b.   Gianni lasciò la stanza [$_{SC}$ PRO [che era ancora sotto gli effetti dell'alcohol]]

        G. left the room that he was still under the effects of alcohol

vi. As mentioned above, PRs and SCs, but not RCs are available with proper names. This is due to the fact that in PRs and SCs the DP and the "*che-clause*" stand in a subject-predicate relation and not a N-modifier relation.

A (non comprehensive) list of asymmetries between PRs and RCs is summarized in Table 3.

Property	RCs	PRs
Refers to individuals	✓	✗
Available w. objects	✓	✗
Available w. Rel. Pronouns	✓	✗
NP modifier	✓	✗
Available w. Proper Names	✗	✓
Available in SC environments	✗	✓
VP modifier	✗	✓
Aspectual restrictions	✗	✓
Refers to propositions	✗	✓

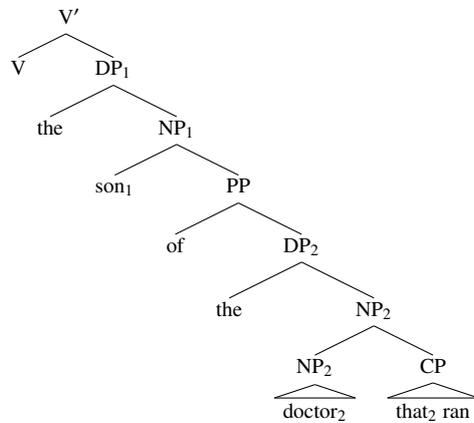Table 3: Summary of asymmetries between PRs and RCs

2.2. PRs and 'attachment'

In the preceding section we have established that the grammar of some languages (e.g. Italian and Spanish) but not others (e.g. English) display an ambiguity between Relative Clauses and Pseudo Relatives and we have illustrated the deep structural and interpretive differences of these two types of sentences. The PR/RC ambiguity was not previously recognized in the literature on RC attachment. It is now time to ask how will the parser deal with this asymmetry and more specifically what consequences might this have on the interpretation of RCs in complex NP environments.

(43) a. RC READING

        Ho [$_{V'}$ visto [$_{DP1}$ il ragazzo [$_{CP}$ che t correva]]]

    b. PR READING

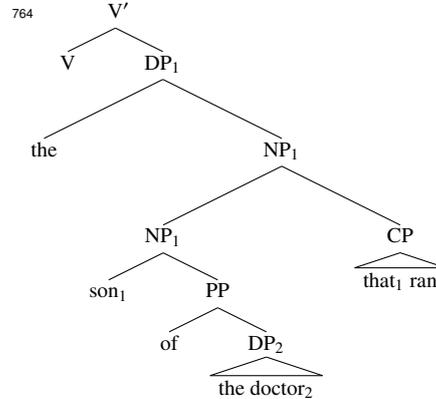   Ho [$_{V'}$ visto [$_{SC}$ [$_{DP1}$ il ragazzo][$_{CP}$ che correva]]]

This distinction, which at first sight and in the context of a simple DP might appear minimal, is bound to have consequences for attachment in the context of complex DPs. When the matrix verb takes an NP as its object, the *che* clause is projected as a RC, and the parser has to choose whether to attach the RC to the first or the second NP (44-a,b).
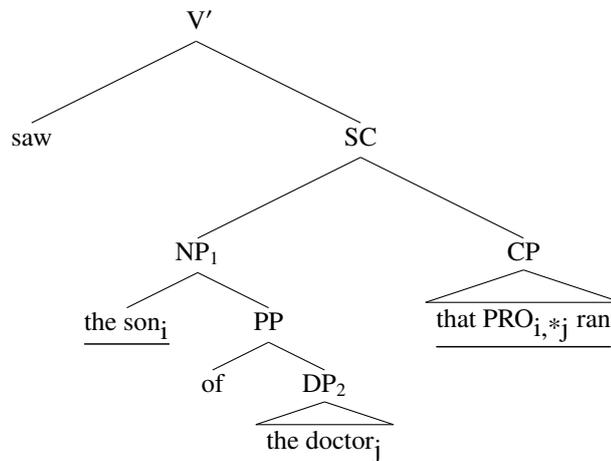
(44)   a. Low Attachment

22

762

```
        V′
       /  \
      V    DP₁
      |   /   \
     the     NP₁
            /    \
         son₁    PP
                /  \
              of    DP₂
                   /   \
                 the    NP₂
                       /    \
                    NP₂     CP
                     |       |
                  doctor₂  that₂ ran
```

b. High Attachment

```
            V′
           /  \
          V    DP₁
          |   /    \
         the      NP₁
                 /    \
               NP₁     CP
              /   \      |
           son₁   PP   that₁ ran
                 /  \
               of    DP₂
                      |
                 the doctor₂
```

765 *No attachment ambiguity with PRs.* However, when the matrix verb takes a PR / SC as its com-
766 plement, as in (46), the ambiguity is gone and the only possible subject for the embedded verb is
767 DP1.

768 (45) PR reading: DP1 only accessible subject
769   Ho [$_{V'}$ visto [$_{SC}$ [$_{DP1}$ il figlio$_i$ [$_{PP}$ del [$_{DP2}$ medico$_j$]]] [$_{CP}$ che$_{i/*j}$ correva]]]
770   Have-1st sing seen the son of the doctor that ran-imperf
771   *I saw the son$_i$ of the doctor$_j$ running$_{i/*j}$*

772

773 (46)

```
                    V′
                   /  \
                saw    SC
                      /   \
                   NP₁     CP
                  /   \      |
           the son₁   PP   that PRO_{i,*j} ran
                     /  \
                   of    DP₂
                          |
                     the doctor_j
```

774 This is more clearly visible when a PR reading is forced. As mentioned above, it is possible
775 to force a PR reading of the *che* string by making overt reference to it as an event, e.g. using
776 a definite description (47-a) or a pronominal form which can only refer to propositions(47-b)
777 (Radford, 1977). Similarly, we can force a RC reading using pronominal forms which necessarily
778 restrict to individuals (48).

23

(47) a. [La figlia$_1$ del   postino$_2$ che corre$_{1/*2}$ (da sola   / *da solo)]$_i$ è un evento$_i$
         the daughter of-the postman that runs   (by herself / by himself) is an event
         eccezionale
         exceptional
         the daughter$_1$ of the postman$_2$ running $_{1/*2}$ (by herself / *by himself) is an excep-
         tional event

     b. Ciò$_i$ che ho   visto è [la figlia$_1$ del postino$_2$ che   correva$_{1/*2}$
         What that have–1st SING seen is the daughter of the   postman that
         da sola /   *da solo]$_i$
         ran by herself /   by   himself
         What I saw is the daughter$_1$ of the postman$_2$ running$_{1/*2}$ by herself / *by himself

As both the Italian and the English translations show, when a PR / SC reading is forced (47), DP2 is not an accessible subject for the Small Clause: not only DP2 cannot be interpreted as the subject of the embedded verb, but the presence of an optional, gender marked, modifier (by himself / herself) renders the sentence ungrammatical and openly shows the restriction to the higher DP1. This gives the "illusion" of High Attachment, but actually, no preference is at stake here: DP1 is the only available subject for the embedded verb, i.e. the only grammatical option. When an RC reading is forced, obviously, both NPs are potential subjects of the embedded verb (48).

(48) Chi ho visto è la figlia$_1$ del medico$_2$ che$_{1/2}$ corre (da solo / da sola)
      Who have–1st SING seen is the daughter of the doctor that runs (alone)
      Who I saw is the daughter of the doctor *(that) runs by himself / herself

The same is true for PR-adjunct, as (49) shows, it is possible to force a PR reading by co-ordinating the *che*-clause with a preceding unambiguous Small Clause. Also in this case, LA is not a grammatical option, i.e. the same restriction to NP1 we have seen with PR-complements is also present with PR adjuncts.

(49) Odio incontrare la figlia$_1$ del postino$_2$ ubriaca$_{1/*2}$ e che parla da sola / *da solo
      I hate to meet the daughter$_1$ of the postman$_2$ drunk.FEM and that speaks by herself / *by
      himself
      I hate to meet the daughter$_1$ of the postman$_{12}$ drunk$_1$ and smoking by herself / *by
      himself

   Summarizing, previous research on RC attachment preferences in complex DP did not take into account the grammatical distinction between RCs and PRs. The distinction has potentially confounded previous results and lead to mistaken generalizations. Importantly, "High Attach-ment" is forced in the environment of PRs; therefore eliminating a PR reading is essential to avoid confounds when testing RC attachment preferences in complex DP environment. In the next section we claim that the following generalization holds: everything else being equal, i.e. when factors such as prosody and referentiality are controlled for, once a PR reading is prevented, a Low Attachment preference emerges both across languages and syntactic structures.

3. Variable Syntax, Uniform Parsing

We propose that everything else being equal, once the distinction between RCs and PRs is taken into account, the following generalizations hold:

(50)   A. Low Attachment preference is observed, across languages and structures, with genuine restrictive RCs, i.e. when PRs are not available.

           B. High Attachment preference is observed in languages and structures which allow for a PR / SC reading.

Support for the generalizations in (50) can obviously come only from empirical work. In what follows we will discuss the rationale behind them and then present the empirical arguments in their support.

The generalization in (50-A) has its roots in the universal nature of locality principles, be it Late Closure, Recency, Merge Right or otherwise. Locality is a natural principle of economy of computation, whose universality and appeal are so strong that when apparent counterexamples to this universal principle are found, as in the RC-attachment literature at hand, a massive amount of work is rightly dedicated to explain their origins. We should underline that the universality of a principle doesn't imply that that principle will always *win* over other factors such as e.g. *referentiality*. As we have seen above, several factors are ultimately involved in deciding attachment and many of them can apparently override locality (see e.g. Altmann et al. 1998 on the effects of context on Late Closure). In other terms: the potential interference of syntactic external factors in attachment does not imply that locality doesn't apply universally *within* syntax. The biggest problem with the residual cross-linguistic variation found in the literature on RC attachment is that it questioned the universality of this principle, and not that it showed that other factors could take priority over it.

As for (50-B), the first thing to be recognized is that when PRs are available, the parser is not dealing with an issue of RC-attachment any longer, as firstly it will have to decide whether to project the relevant string as a RC or a PR. This type of choice is not regulated by Late Closure types of principles, but by principles of the *Minimal Attachment* type.[15] While both principles can at a certain level of abstraction be seen as two instantiation of a universal principle of locality, favoring closer, most accessible, targets (with distance defined over different variables: structural complexity, structural distance, recency, frequency), they are clearly involved in different processes. The Late Closure type relates more directly to Recency effects applying *within the string just parsed*, i.e. attach α to the most recent element capable of carrying a particular relation α; the Minimal Attachment type relates to the relative ease of projecting a given string as a constituent of type A or B, i.e. when deciding between two, or more, alternative parse for a constituent, choose the simplest option. We propose the following:

(51)   PR-first Hypothesis: When PRs are available, everything else being equal, they will be preferred over RCs.

This preference arises because PRs are both structurally and presuppositionally simpler than RCs:

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[15] Minimal Attachment: Attach incoming material into the phrase-marker being constructed using the fewest nodes consistent with the well-formedness rules of the language.

- From a structural perspective, i.e. for Minimal Attachment, Small Clauses are by definition smaller, and arguably less complex, than full Relative Clauses. The heavy constraints imposed on PRs, but not on RCs, in terms of Tense, Aspect, type of argument etc. analyzed in the preceding section, point to the presence of a richer and more articulated functional domain in the latter than the former.

- From a Reference Theory perspective (Crain & Steedman, 1985; Altmann & Steedman, 1988), the RC analysis requires building a context which contains more referents than the SC analysis. The felicitous utterance of a sentence like: *Ho visto il ragazzo che correva / I saw the boy running*, as a RC presupposes a context containing a set of boys. The PR interpretation, on the other hand, only requires to introduce an event of running as the theme of see, and this event has a boy as its agent, i.e. only one boy is presupposed in the PR context.[16]

Importantly, because of their tripartite nature (on which see Declerck 1981; Cinque 1992 and the discussion in section 2.1 above), PRs become an option for the parser at multiple points: i. at the offset of the verb, as a complement SC; ii. at the offset of the NP, as a PR adjunct within VP or NP. Consider the options of the parser at these two points:

i. In the presence of a PR taking verb the parser needs to choose between a NP continuation or a SC continuation. Much literature in psycholinguistics has shown a strong tendency for the parser to posit nominal complements over clausal complements (cf. the well-know garden-path effects with: *the students knew the answer was in the back of the book*, Ferreira & Clifton (1986); Traxler et al. (1998); Pickering et al. (2000)). It should be noted that this literature has dealt with a relatively small set of verbs that allow clausal complements, and to our knowledge it has never dealt with the type of verbs we are presently discussing, nor with the choice between NP and SC complements. It is an empirical question (to be addressed in future work) whether this preference also extends to the present environment.[17]

If this preference also extends to SCs, we might expect the parser to prefer a NP complement parse:

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[16]The two types of *principles* can obviously cohexist and interact and it is reasonable to suppose that, as in other such cases, contextual effects might override structural principles of parsimony. The important question, as usual, is whether this influence can be found at all stages of processing or only at a later stage. This is obviously an empirical questions that we reserve to address in future work. The only data using context in RC attachment, that we are aware of, comes from Desmet et al. (2002b) who manipulated the preceding context in Dutch and did *not* find it to interfere with attachment preferences (the usual generalized HA preference emerged), at least not at the earliest stages of parsing. This results, however, like all the others considered so far, did not take into account possible effects of PR availability, and threfore do not allow strong conclusions to be drawn.

[17]It should also be kept in mind that many PR-taking verbs also allow a number of other clausal complements, which raises the question (not addressed in this paper) of whether the parser deals with these multiple possibilities.For a detailed discussion of clausal complementation see Moulton (2009). Here is a list of different types of clausal complements introduced by perceptual verbs (from Moulton, 2009, ex.1, p.2): i. *John saw Fred leave early*, bare infinitive, direct perception; ii. *John saw Fred leaving early*, gerundive, direct perception; iii. *John saw Fred owning a house*, gerundive, imaginative; iv. *John saw Fred to be a party-pooper*, infinitive, belief; v. *John saw that Fred left early*, finite clause, factive.

[NP il ragazzo]

Ho [VP [V' visto ...

[SC [NP il ragazzo] ...]
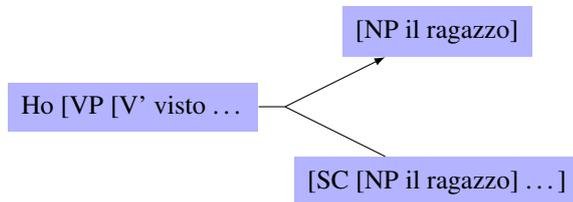
Importantly, at this stage there's no difference between PR languages and non-PR languages like English, i.e. the English parser will also have to decide whether to parse NP as the direct object of *see* or as the subject of a Small Clause. If the parser considers multiple options in parallel, this might explain the relatively high number of HA preferences in LA languages like English (around 40%).

ii. Assuming a preference for complement NP complements over clausal complements, a cross-linguistic difference arises when the parser hits the complementizer: in languages allowing PRs, in fact, it will be presented with a choice between RC and PR, as there is still the possibility to interpret the *che*-clause as a PR adjunct. Importantly, there are good reasons to postulate that a PR / SC parse is less complex, both structurally and interpretively, than the RC parse.

[CP che correva]

Ho [VP [V' visto [NP il ragazzo ...

[SC che correva]
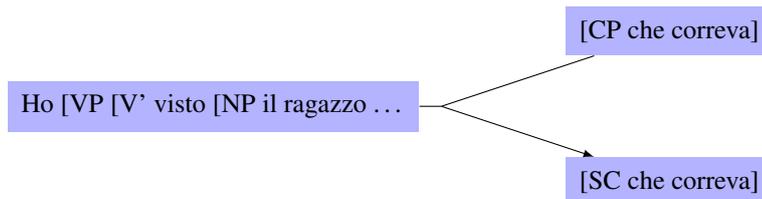
Whether the best way to capture Minimal Attachment is in terms of number of nodes, relative accessibility of the contextual representation associated with each alternative, or as a function of frequency / predictability of each parse, or even as a combination of these factors, is beyond the scope of this work, and in many ways irrelevant to the point we arguing for, especially since different approaches would probably converge on this prediction. What is relevant to the present point is that some principle akin to Minimal Attachment is at stake here, we argue that when a simpler option is available: restrictive relatives are not the preferred parse in the absence of a context supporting the relevant presupposition. There is potentially a third reason, based on principles such as *Relativized Relevance*, of why PRs should be preferred to RCs: with the former, but not with the latter, the *che*-clause is conveying additional information about the event described in the matrix clause, i.e. the most salient part of the clause in the discourse representation.

The hypothesis in (51) is easily falsifiable since it makes several strong predictions, both about offline judgments and online measures, a few of which are listed below. All else being equal (i.e. in the absence of strong biases introduced by prosodic, contextual, lexical and other factors):

i. High Attachment preferences will emerge whenever PRs are available;

ii. RC-only continuations should be harder to parse than PR-compatible continuations, e.g. we expect (52-a) to be easier to parse than (52-b):

27

(52) a. Ho visto il ragazzo che correva la maratona
I saw the boy that ran the marathon
PR: I saw the boy running the marathon / RC: I saw the boy that ran the marathon
b. Ho visto il ragazzo che correrà la maratona
RC only: I saw the boy that will run the marathon

iii. In the context of complex NPs, HA disambiguation should be easier to parse for PR-verbs than RC-only verbs.

iv. High Attachment preferences will also be observed in any context allowing an ambiguity between a reduced RC and a correlate of PR interpretation, e.g. the Acc-*ing* construction in English (*I saw the son of the doctor (that was) running*), Prepositional Infinitive Constructions in Portuguese (PIC, Raposo 1989: *Vi o filho do medico a correr*).[18]

That a SC reading is preferred in Acc-ing constructions in English, is visible also from the following garden-path effect:

(53) I saw the daughter of the woman dancing tomorrow at the gala.

The local ambiguity between a SC and a reduced RC reading, seems to be resolved in favor of the former: introducing a temporal mismatch between the *dancing* event (tomorrow) and the matrix event *saw* (past) forces reanalysis of the embedded clause as a RC (temporal mismatch is not allowed with SCs and PRs):

(54) I saw the daughter of the woman (that will be) dancing tomorrow at the gala.

(55) I saw the ballerina dancing kiss the man

(56) Ho visto la ragazza che ballava baciare un uomo

In the remainder of this paper, we show that (at least some of) these predictions are corroborated by both previous findings and novel experimental results. Variation across languages is discussed first 3.1, followed by variation across structures 3.2. Finally, two novel experiments on attachment preference in Italian are presented in section 4. The results from the experiments, which manipulate PR availability, strengthen the generalizations in (50).

3.1. Explaining variation across languages

Since the pioneer study of Cuetos & Mitchell (1988), a great number of studies have investigated RC attachment across several languages. The pattern found, or better, the lack of a pattern has puzzled psycholinguists for more than twenty years. English speakers appear to behave like Romanian and Basque speakers (among others) in showing a preference for LA, while Dutch speakers match Italian, Greek and Japanese in their preference for HA.

Importantly, it should be pointed out that (all, to our knowledge) previous work on RC attachment used subject RCs, which, as mentioned above, are the only type compatible with a PR reading. More in depth investigation is certainly needed to settle this issue, still it seems hard to reduce the strength of the above correspondence to random factors. Pending further research on

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[18]On PIC see Grillo et al. (2012) and Grillo et al. (2013a) on Acc-*ing* constructions.

Language	Attachment	PRs
English	Low	*
Romanian	Low	*
Basque	Low	*
Chinese	Low	*
German (?)	High/Low	*
Russian (?)	High	*
Bulgarian (?)	High/Low	*
Norwegian (?)	Low	✓
Swedish (?)	Low	✓
Spanish	High	✓
Galician	High	✓
Dutch	High	✓
Italian	High	✓
French	High	✓
Serbo-Croatian	High	✓
Japanese	High	✓
Korean	High	✓
Greek	High	✓
Portuguese	High	✓

Table 4: Attachment Preferences and PR availability

Russian, Swedish and Norwegian a reanalysis of the mixed results in Bulgarian and German (but see discussion below), we take the generalization in (50) to be strongly supported by the empirical results.[19] A few notes, and a general recommendation, are in order when dealing with sets of data of this magnitude and heterogeneity (for methods, analyses etc.), since we often do not have the possibility to assess all characteristics of the studies that produced them. This is particularly important in the present context in which a novel, previously unnoticed, factor is introduced into the equation and was not taken into account when these studies were designed/conducted. This means that such data should be handled with care both to support and to falsify a theory. In the remainder of this section we briefly discuss some of the potential issues that arise when considering such large dataset in the absence of all information about the methods employed.

First of all, remember that several factors can determine the availability of PR: not only the semantic properties of the matrix verb (does the matrix V subcategorize for PRs?), but also the temporal and aspectual properties of the matrix and embedded verb. Remember further that different kinds of PRs exist (i.e. argument/adjunct) and different types of verbs differ in their ability to combine with them (e.g. perceptual verbs can take both argument and adjunct PRs,

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[19]It is worth noticing that all three of these languages make use of obligatory relative pronoun in the context of RCs. Additionally, all three have writing system which force the use of a comma in between the NP and the relative pronoun. Importantly, the presence of a comma has been shown to have a strong influence on reading, particularly in disambiguating ambiguous structures (Hill & Murray, 1998). Commas have also been shown to elicit a Clousure Positive Shift component in ERP, a component associated with the processing of prosodic boundaries (Steinhauer et al., 1999; Steinhauer & Friederici, 2001; Steinhauer, 2003). The presence of commas, by triggering a prosodic boundary between N2 and the relative pronoun, might have an influence on attachment, crucially in the direction of HA. Nevertheless, see Augurzky (2005), p. 99 for results in German which do not support this argument.

whereas verbs of the *incontrare / meet* kind only take adjunct PRs; see section 2.1 and Cinque 1992 for discussion). For this reason to obtain a complete picture we need to proceed to a more detailed study of previous results, one that takes into account the fine structural and semantic properties of the stimuli used.

The problematic data from Swedish and Norwegian, as well as the unproblematic ones from Romanian come all from Ehrlich et al. (1999), a study which is often cited in the RC-attachment literature, but which has never been published in paper format (only a CUNY abstract is available online). This makes it obviously very hard to recover even the most basic (and in this context most important) information: whether PR-verbs were used and how many of them were used.

Secondly, as mentioned above, contrasting results are often found in the literature. German, for example, is traditionally considered a High Attachment language, based on the work of Hemforth et al. (1998, 2000b,a); Konieczny & Hemforth (2000). More recently, however, Augurzky (2005) conducted a series of experiments in German in which she carefully controlled for several possible confounding factors (e.g. all NPs were matched for frequency, number and stress pattern of syllables, the semantic relationship between the two NPs was kept constant and the RC combinations with both NPs were matched for plausibility), she found a Low Attachment preference and convincingly argued that German is, in fact, a Low Attachment Language.

Conflicting data at times comes even from the same sources. Sekerina et al. (2003) discuss 2 experiments on attachment in Bulgarian which yielded opposite results: High Attachment preference was obtained in the first experiment and Low Attachment in the second. Bulgarian being a nonPR language, we would predict LA preference, everything else being equal. Importantly for the present point, while in the first experiment the stimuli were presented in a *out-of-the-blue* setting, the stimuli of the second experiment were introduced by strong Relative Clause context.

In the second experiment the sentence stimuli were preceded by two sentences (57-a,b) and a visual cue. The latter consisted of two sets of objects (e.g. two sets of triangles and triangle tips) distinguishable by some specific property (e.g. color). The complex DPs were contained in a question (57-c) which probed the participant to single out a specific member from the two sets of triangles. This type of context function as a perfect introduction for a RC reading.[20] More importantly, the sentences used in this second experiment do not allow for PRs for independent reasons (i.e. there is no verb capable of selecting a PR).

(57)   a.   Eto edin rozov triâgâlnik i edin žâlt triâgâlnik.
            This one pink triangle and one yellow triangle
       b.   Vârxovete im sa različno ocveteni.
            The tips them are differently colored
            This is a pink triangle and a yellow triangle. Their tips are different colors.
       c.   Kakâv cvjat e vârxât na triâgâlnika, v kojto e narisuvan čadâr?
            What color is the tip of the triangle in which is drawn umbrella
            What color is the tip of the triangle that has an umbrella in the middle?

Finally, experiment 1 required *reading* the stimuli, which might have influenced the prosodic phrasing because of the presence of a comma separating NP2 and the relative pronouns. The

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[20]Note that this type of setting is very different from, and much more restrictive than, the one used inDesmet et al. (2002b). While the context in Desmet et al. still allows for a PR reading (it only introduces a set of alternatives for either NP1 or NP2), the present context simply rules out a PR reading completely.

stimuli of experiment 2, however, were presented auditorily, which eliminates the possibility that the comma might have played a role. In sum, we predict that when a RC context is used, as in experiment 2, a Low Attachment preference should be observed, while the results of experiment 1 still need to be further investigated.

Thirdly, while PRs are widely attested in a variety of environments in certain languages, e.g. in Italian, their availability in other languages (e.g. Portuguese) is subject to great variation, both regional, generational and often what appears to be purely individual. This variation obviously needs to be taken into account, but obviously this has never been done. Even in those cases in which we do have access to the sentence stimuli used in the experiments, we still do not know what kind of fillers were used by the authors. This is particularly important in the light of possible syntactic priming effects: a filler containing a Small Clause immediately preceding a sentence stimulus, for example, might well prime the subject for a PR reading. A final note on non-PR languages and SC contexts: as discussed in section 3, in the presence of PR-type verbs even the parser of a non-PR language like English might temporarily consider a SC continuation. It might thus be reasonable to hypothesize that in the presence of SC introducing verbs (such as perceptual verbs) a higher tendency for HA might be observed also in non-PR languages such as English. Given its serial nature, when the parser encounters an SC introducing predicate, it will have to choose between a SC and NP parse of the following material. Early commitment to a SC reading might have effects later on in the parse even when the RC is introduced and ultimately influence attachment preferences. This might explain the relatively weak effect of Late Closure in English and other LA languages (around 60%). An empirical investigation of this possibility is being carried on as we write (Grillo et al., 2013a).

In sum, in order to strengthen these results, in-depth comparative work must be conducted, taking into account the various factors involved in the availability of PRs. Yet, while we cannot take this generalization at face value, it is hard not to be struck by the strength of the prediction and the variety of languages it correctly applies to. Once again, advocating for the importance of PR-availability does not imply claiming that other factors will not play a role in RC-attachment, especially when the PR option is not available.

3.2. Explaining variation across syntactic structures

As mentioned above, several authors have shown that the characteristic asymmetry in attachment preferences disappears in certain specific syntactic environments, i.e. speakers of HA languages, such as Spanish, display a Low Attachment preference in those environments. A few of such environments are listed below:

(58) SUBJECTS   (Hemforth et al., unpublished)
     a.   The maid of the actress that was sitting on the balcony is blonde
     b.   La criada de la actríz que estava sentada en el balcón es rubia

(59) NOMINALS   (Gibson et al., 1996)
     a.   The lamp near the painting of the house that was damaged by the flood
     b.   la lámpara cerca de la pintura de la casa que fué dañada en la inundacíon

(60) TYPE OF P   (De Vincenzi & Job, 1993, 1995)
     a.   Qualcuno ha sparato alla governante con l'attrice che stava seduta in balcone
     b.   Someone shot the maid with the actress that was sitting on the balcony

(61) UNAMBIGUOUS RELATIVE PRONOUNS (Fernández, 2003, p.31)

Vi al hijo del medico el cual estaba en el balcón

I saw the son of the doctor who$_{rel-pro}$ was on the balcony

Crucially, what all these contexts have in common is their inability to introduce propositions, i.e. PRs are *not* available in any of these environments, and LA is correctly predicted by the generalization in (50). That the PR reading is not available in these contexts is well illustrated by the English version of the examples (58), (59) and (60): even in the absence of an overt *that was* the string *"sitting on the balcony"* is still interpreted as a reduced relative clause (despite this being a generally dispreferred interpretation) and not as a Small Clause of the *Acc*-ing type. While the lack of PR readings in the presence of relative pronouns is extremely clear, more needs to be said about subjects, as well as thematic prepositions and nominals, which also happen to be 3-sites NPs. As for subjects, we should remind that it is not *all* subjects that prevent PRs, the example in (47)[a], reported in (62) is an example of felicitous (even obligatory) PR in subject position.

(62) [La figlia$_1$ del postino$_2$ che corre$_{1/*2}$ (da sola / *da solo)]$_i$ è un evento$_i$ eccezionale

the daughter of-the postman that runs (by herself / by himself) is an event exceptional

the daughter$_1$ of the postman$_2$ running $_{1/*2}$ (by herself / *by himself) is an exceptional event

In this case, however, the PR interpretation is authorized (and enforced) by making reference back to the whole subject as an event. When this type, or others such licensing elements are not present, as in e.g. (58), the PR interpretation is not available. In the following sections we will elaborate further on the role of the type of Preposition 3.2.1 and the nominals 3.2.2.

3.2.1. Types of Preposition

An anonymous reviewer pointed out that Small Clauses are available in the following sentence, despite the presence of the preposition with (63-a). This is also true of PRs (63-b)

(63) a. The maid with the blonde hair dancing the polka is an event you shouldn't miss.
      b. La governante con i capelli biondi che balla la polka è uno spettacolo da non perdere.

What is at stake here is the difference between Restrictive (which can be replaced by a RC) and non-Restrictive uses of *with*, which can be paraphrased with "*together with / in company with*". The latter use is also called *comitative* in the literature.[21] The examples in (63) and (62) both involve a clear case of restrictive preposition, both NPs can be paraphrased with: *the actress which has blonde hair*. The restrictive type of *with* is easily constructed with properties, such as *being blonde*, as is generally the case for restrictive modifiers, can easily be used in subject position, and in complement position of stative verbs, such as "*be married to*", which obligatorily select NP complements, as well as other verbs (e.g. PR-verbs), (64) show.

(64) a. The maid with blond hair is beautiful / the actress who has blond hair is beautiful

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[21]A detailed discussion of the literature on comitatives, and the additional locative, interpretation would take us too far astray from the present discussion, but see e.g. Mcnally (1993); Lasersohn (1995); Kayne (1994), among others. Here we will limit ourselves to point out a few differences in distributional and structural properties of the two types, which should provide enough information for the present discussion.

b. John is married to the maid with blond hair / John is married to the actress who has blond hair

c. John saw the maid with blond hair

The non-Restrictive type of *with*, which emerges more clearly when using two animate nouns, i.e. using *with the actress* instead of *with blonde hair* renders the sentences ungrammatical, unless *with* is interpreted restrictively. This is because the non-Restrictive type is *not* available with NPs denoting properties. Interestingly, like PRs, this type of P is ambiguous between a restrictive and non-restrictive reading, the ambiguity, however, disappears in the environment of subjects (65-b) and complement of a stative predicate (65-c):

(65) a. John saw the maid with the actress
         non-Restrictive = "*John saw the maid be with the actress*"
         Restrictive = "*John saw the maid that is with the actress*"
      b. #The maid with the actress is taking a bath   Restrictive Only
      c. #John is married to the maid with the actress   Restrictive Only

Interestingly, replacing the property-denoting NP *with blond hair* with the non-property *with the actress*, renders the sentences in (63) very hard to parse and only acceptable in the Restrictive interpretation of *with*, i.e. non-restrictive *with* is not allowed in subject position.[22]

(66) a. #The maid with the actress dancing the polka is an event you shouldn't miss
         Restrictive only
      b. #La governante con l'attrice che balla il tango è un evento da non perdere
         Restrictive only

That the relevant property is the restrictive nature of the NPs can be demonstrated by replacing nouns with proper names, which as seen above can only be restricted in special contexts, and thus artificially excluding the restrictive reading. As (67) shows, this generates ungrammaticality:

(67) a. *John with Mary is / are arriving
      b. *John shares a house with Mary with Bill

Replacing the nouns with proper names, on the other hand, should still be allowed in the non-Restrictive condition, which is confirmed by (68).

(68) John saw Mary with Bill

Crucially, however, it is not possible is to add a PR, or any other type of clausal element to this sentence (ignore the irrelevant reading of *running* referring back to the matrix subject):

(69) *John saw Mary with Bill run / running / sad / to be a party pooper
         cf.: John saw Mary run / running / sad / to be a party pooper

This is expected, since we have seen that the non-Restrictive type cannot appear in subject position, which is what would be required of it to combine with the various predicates in (69). That is, the ungrammaticality of non-Restrictive *with* in subject position precludes them from appear-

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[22]See Kayne (1994), p.63-66, for a discussion of why non-restrictive *with* is not allowed in subject position. Thanks to Klaus Abels for pointing this out.

ing as subjects of Pseudo Relative Small Clauses, which explains why PRs are not allowed with *non-Restrictive with*.

That the interpretive difference between the two types of *with* is structurally represented can be demonstrated by looking at the asymmetry between extraction in the non-Restrictive (allowed) vs. the Restrictive (not allowed) interpretation. As (70) shows, we can freely extract both the

(70) a. Question: With whom did John see the maid <with whom>?
          Answer: He saw her with the actress.
      b. Question: Who did John see the maid with <who>?
          Answer: He saw her with the actress.
      c. Question: *With whom does [the maid <with whom>] take a bath?
          Answer: *The maid with the actress takes a bath.
          Answer: (to irrelevant matrix interpretation of the PP) The maid takes a bath with
          the actress.
      d. *Whom did [the maid with <whom>] take a bath

This pattern might be attributed to the independent restriction on extraction from subjects (Ross, 1967). However, the same pattern emerges when considering these type of NPs in object position:

(71) a. *With whom is John married to [the maid <with whom>]
      b. Who is John married to [the maid with <whom>]

This is not surprising if we take restrictive *with* to introduce some kind of reduced restrictive RCs. RCs are well-known blocker of syntactic movement, as the example below shows:

(72) a. John is married to [$_{DP}$ the maid [$_{RC}$ that is with the actress]]
      b. *With whom is John married to [$_{DP}$ the maid [$_{RC}$ that is <with whom>]]
      c. John kissed [$_{DP}$ the maid [$_{RC}$ that loves the boy]] *Whom did John kiss [$_{DP}$ the maid
          [$_{RC}$ that loves <whom>]

The same pattern arises with Italian *con*, as (73) illustrates:

(73) a. Question: Con chi ha visto la governante <con chi> Gianni?
          With who has seen the maid <with who> Gianni?
          Answer: Con l'attrice.
          With the actress
      b. Question: Con chi è che Gianni ha visto la governante <con chi>?
          With whom is it that G. has seen the maid <with who>?
          Answer: Con l'attrice.
      c. *Con chi è sposato Gianni con la governante <con chi>?
          With who is married G. with the maid <with who>?
          With who is G. married with the maid <with who>

Looking back at the problematic example, we can now show that not only it receives a restrictive interpretation, but also that it is structurally represented as a Relative Clause.

(74) a. The actress with the blonde hair dancing the polka is an event you should not miss
      b. Q: *With what is the actress <with what> dancing the polka?
          A: With blonde hair.
      c. IRRELEVANT:

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Q: With what is the actress dancing the polka <with what>?
        A: With fluid movements.
    d. *What is the actress with <what> dancing the polka?
    e. Q: *With who is the actress <with who> dancing the polka?
        A: The actress with the maid is dancing the Polka.
    f. *Who is the actress <with> dancing the Polka?
    g. IRRELEVANT:
        Q: With who is the actress dancing the Polka <with who>
        A: The actress is dancing the polka with Arthur.

Since non-Restrictive *with* is not allowed in subject position, we can conclude that SCs and PRs are allowed only when Restrictive *with* is used in a complex NP. Restrictive *with*, however, does not seem to be the favor ed interpretation when two animate NPs are present, as shown by the perception of ungrammaticality triggered by these types of NPs in subject position.

Summarizing: There is a difference between restrictive and non-restrictive *with*, this difference is both interpretive and structural. PRs are allowed with restrictive but not with non-restrictive *with*. This is due to the fact that non-restrictive *with* is not allowed in subject position. We thus predict a different pattern to arise with the two types of preposition and we leave it open for further investigation. We should also emphasize that experiments manipulating *with* have typically used

3.2.2. No need for parametrization of Relativized Relevance in Three-NP sites

As discussed in section (12) above, Gibson et al. (1996, 1999) reported a common U-shaped pattern in RC-attachment in Spanish and English in the context of 3 possible attachment sites. We will argue that these effects are due to the interaction of PR availability and a principle akin to either Relativized Relevance or Predicate Proximity (the two principles are mainly distinguished by their respective availability at early stages of parsing, a topic over which we have nothing to say here).

Let's first discuss the results of Gibson et al. (1996), remember that sentence fragments, i.e. nominals, that could have been taken to be the subjects of a potential forthcoming predicate, were used in this experiment. The primary, and *universal*, LA preference found in these contexts is explained when considering that PRs cannot possibly be introduced in this contexts as no PR-taking predicate (either Verbal or Nominal) is present. In lack of a PR option, the embedded clauses can only be interpreted as RCs, whose attachment will be heavily influenced by Locality principles.

The U-shaped pattern, i.e. the secondary preference for NP1, can be explained under either Relativized Relevance or Predicate Proximity. Importantly, however, there's no need to parametrize the strength of this type of principle, as the variation across languages (or lack thereof) is already explained by the unavailability of PRs in this environment.[23]

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[23]One additional difficulty when evaluating the results in Gibson et al. (1999) because of different varieties of Spanish of their participants, i.e. it's hard to know whether PRs are available in all these varieties of Spanish, especially since PR-availability in some languages is strongly subject to dialectal variation. (Gibson et al. (1996), p. 28:"*The 24 subjects included were from Mexico (8 subjects), Puerto Rico (6), Spain (3), Argentina, Chile, Salvador, Guatemala, Peru, and Venezuela; the remaining subject was a native of the United States, with a Mexican father, and learned Spanish in the home.* The same is true for the participants in Gibson et al. (1999), p. 606: "*Spain (8 participants), Mexico (3), the Canary*

To account for the results in Gibson et al. (1999) we will hypothesize that the likelihood of projecting a PR decreases when increasing the distance between the PR-taking predicate and the potential Small Clause. As the likelihood of a PR parse diminishes, that of a RC parse increases, which puts Locality in charge again and explains the primary LA preference. As above, the application of Relativized Relevance / Predicate Proximity accounts for the secondary preference for N1 attachment. Importantly, once again, this account does not require a parametrization of this principle. The difference between these results and the results in Dutch (Wijnen, 1998; Wijnen et al., 1999), in which the U-shaped pattern favors still favors HA (NP1 > NP3 > NP2) might be due to a difference in the number of PR-verbs used in the two experiments, however, more empirical work is required to provide a full account for these differences.

Summing up, once the availability of PRs is taken into account, previous (often conflicting or confusing) results from the experimental literature on RC attachment are amenable to a uniform explanation: as predicted, High Attachment is observed in a given language only in contexts that allow for a PR reading, whereas in all genuine RC contexts, unless factors such as prosody or referentiality are involved, a Low Attachment preference prevails. Importantly, the patterns discussed in this section do not simply follow from position (subject vs. object) or category (N vs. V). What drives attachment preferences is the availability of PRs, i.e. the presence of a context capable to introduce propositions. Manipulating this property of the contexts changes this state of affairs, often quite dramatically: by adding reference to an event, we can force the string to be interpreted as proposition and rule out the RC reading. This change can be diagnosed easily, as it makes the overt presence of the restrictive marker *that was* ungrammatical. Compare (58) with (75):

(75)   The maid of the actress (*that was) dancing the polka is an event you shouldn't miss

In (75) the RC reading is rendered ungrammatical by the semantic (*is an event*) properties of the matrix clause and the PR/SC is the only available interpretation despite it being embedded within a subject. Importantly, the experimental works cited above did not make use of these special contexts.

To further support the centrality of this factor, Fernandes (2012) and Grillo et al. (2012) predict that using nominals that can introduce propositions also change the universal attachment preference reported in Gibson et al. (1996), i.e. it will eliminate the primary LA preference and the overall U-shaped preference, in those languages that allow PRs in this special contexts (76-a) and in the context of *Acc*-ing constructions in e.g. English (76-b):

(76)   a.   La foto [$_{SC}$[del figlio del medico] che corre] è davvero bella
          b.   The picture of [$_{SC}$[the son of the doctor] running] is very beautiful

More specifically, we predict a preference to attach to NP2 in both PR languages and nonPR languages in the contexts in (76-a,b).[24]

Islands (2), EI Salvador (2), Peru (2), the United States (2), Colombia, Cuba, the Dominican Republic, Nicaragua, or Venezuela.").

[24]Three experiments in English and European Portuguese presented in Fernandes (2012); Grillo et al. (2012, 2013a) offer preliminary support for this prediction.

3.3. A note on PRs and prosody

In section (14) we briefly discussed the Implicit Prosody Hypothesis (Fodor, 1998a,b, 2002). Now that we have introduced PRs and discussed the confounding role they might have played in the preceding literature on RC attachment, we can ask to what extent, if any, PR-availability might be responsible for the observed differences in prosodic phrasing across languages (Jun, 2003). A full answer to this question is beyond the scope of the present paper, and we will limit ourselves to point out that, besides having a different syntax / semantics, PRs are also associated with different prosodic representations. Notice that claiming that PRs might be involved in determining default prosodic phrasing across languages does not in any ways constitute a threat for the IPH, in fact we believe quite the contrary to be true, as the IPH itself has little to say about those default preferences.

We'll first point out that a specific intonational phrasing is required by PRs, which is different in crucial ways from that of RCs. PRs are compatible with the presence of a prosodic boundary placed in between NP2 and the *che-clause*, as in (77-a); and incompatible with a boundary following NP1.

(77)   a.   *PR compatible break*
          Ho visto la figlia del postino // che correva da sola / *da solo
          I saw the daughter of the postman that ran by herself / himself
          I saw the daughter of the postman // running by herself   SC / RC
   b.   *PR incompatible break*
          Ho visto la figlia // del postino che correva da solo / *da sola
          I saw the daughter of the postman that ran by himself / herself
          I saw the daugter // of the postman running by himself / herself   RC / *SC

This seems to be true also of English SCs, as both the glosses to (77) above and the examples in (78) show:

(78)   a.   *SC compatible break*
          John saw the daugter of the postman // working by herself / ?? himself
   b.   *SC incompatible break*
          John saw the daugter // of the postman (that is) working by himself / ?? herself

A partial reappraisal of the effects of RC length in attachment might also necessary, as manipulating the of the RC we might involuntarily manipulate PR availability:

(79)   a.   *Short RC, PR available*
          Ho visto il ragazzo che correva
          I saw the boy that ran
          I saw the boy running
   b.   *Short RC, PR unavailable*
          Ho visto il ragazzo che ami
          I saw the boy that you love
   c.   *Long RC, PR available*
          Ho visto il ragazzo che correva la maratona domenica scorsa
          I saw the boy that ran.IMPERF. the marathon last sunday
   d.   *Long RC, PR unavailable*
          Ho visto il ragazzo che ha corso la maratona domenica scorsa

I saw the boy that has run.ᴘᴇʀꜰ. the marathon last sunday

Here we will simply point out that extra care should be taken with length manipulation, as this can also involve manipulation of e.g *inner aspect* of the embedded verb, compare the PR-compatible process *run* in (79-a) with the PR-incompatible state *love* in (79-b); or *outer aspect* of the embedded verb, compare the PR-compatible imperfective *correva* with the PR-incompatible perfective form *ha corso* in (79-c,d). Inner and outer aspect are just two of the possible factors that are involved in deciding PR-availability, and are in turn influenced by a number of other factors (e.g. *Ho visto il ragazzo che correva ogni giorno / I saw.*ᴘᴇʀꜰ *the boy that ran.*ɪᴍᴘᴇʀꜰ *every day*, contains an imperfective, but the modifier *every day*, forces an habitual reading which rules out a PR interpretation because of its incompatibility with the perfective of the matrix verb).

Summarizing, PR-availability might be partially responsible to explain cross-linguistic differences in default phrasing in complex NPs plus RC / PR strings. PR-availability might also contribute in shaping changes in attachment preferences generated by RCs of different length, and should be controlled for when investigating this type of effects. Once again, advocating a role for PRs simply amounts to saying that these structures are real and cannot be ignored when investigating attachment and prosody, it does not imply negating the clear role played by prosody in parsing.

Having discussed some of the potential implications of the role of PR-availability in the previous literature, we now turn to the discussion of two novel experiment in which this availability was the direct object of manipulation.

4. New experimental evidence

In the remainder of this section we present the results of two novel experiments in Italian in which we used different grammatical constraints (among those presented in section 2.1) to selectively manipulate PR availability. Based on the PR-first hypothesis in (51) we predict to observe LA preference in unambiguously RC contexts, and HA preference in contexts ambiguous between a PR and RC parse.

4.1. Experiment 1

As discussed above, PRs can only be constructed with subjects of the embedded clause and in the presence of a verb or noun selecting for a proposition. **??** predicts LA preference to arise in all the conditions in which RC was the only available parse (condition B, C, D below), and a significantly higher number of HA preferences to arise when both PR and RC are allowed (condition A).

Method and Participants   (N=31) Italian native speakers participated in an offline questionnaire on attachment preferences in complex DPs. All the participants gave their informed consent before taking part in the study and were naive as to the goals of the experiment.

Materials and Design   20 sets of target sentences were constructed with 4 versions for each sentence in a 2x2 design crossing *Position* (right branching [RB] vs. center embedding [CE]) and *ExtractionSite* (subject vs. object). 4 lists of 20 target and 80 filler sentences were created using a latin-square design. The fillers didn't contain either RCs or SCs/PRs. Target

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and filler sentences were pseudo randomized so that subjects would never see a target sentence immediately following another target sentence. Meaning was kept constant using passives in the A and C condition. An example of the sentence stimuli and questions is reported in (80). Position of extraction is indicated with <EC>.

(80) **Stimuli**

    a.   PR / RC CONDITION: RB-SUBJECT
        il barista ha guardato l'amico del cliente che <EC> veniva sorpreso dai colleghi.
        the barman has watched the friend of-the client that <EC> became surprised by-the colleagues
        the barman watched the friend of the client (that was) being surprised by his colleagues

    b.   RC ONLY CONDITION: RB-OBJECT
        il barista ha guardato l'amico del cliente che i colleghi avevano sorpreso <EC>.
        the barman has watched the friend of-the client that the colleagues had surprised <EC>
        the barman watched the friend of the client that his colleagues had surprised

    c.   RC ONLY CONDITION: CE-SUBJECT
        l'amico del cliente che <EC> veniva sorpreso dai colleghi è molto buono.
        the friend of-the client that <EC> became surprised by-the colleagues is very nice
        the friend of the client that was surprised by his colleagues is very nice

    d.   RC ONLY CONDITION: CE-OBJECT
        l'amico del cliente che i colleghi avevano sorpreso <EC> è molto buono.
        the friend of-the client that the colleagues had surprised <EC> is very nice
        the friend of the client that his colleagues had surprised is very nice

                →CHI ERA SORPRESO? A. AMICO B. CLIENTE
                (*who was surprised? A. friend B. client*)

To obtain as close a match as possible between this study and previous studies on attachment, we used a mix of verb types in the matrix clause using both verbs that take PRs as complements (N=5; e.g. *see, hear*) and verbs that only allow for PR adjuncts (e.g. *meet*). Thematic assignment in the embedded clauses was kept constant across conditions using passive voice in the A and C condition.[25] As indicated in (80), the only condition allowing for a PR reading of the embedded clause is condition A. RC reading was forced in all other conditions: extraction of the object prevents a PR reading in condition B, while embedding within a subject in the absence of any predicate selecting for a proposition disallows the PR reading in condition C and D. The target sentences were interspersed among 80, unambiguous, unrelated fillers. No SCs or RCs were used in the fillers.

The sentences were organized in a latin-square design so that each subject only saw one version of each sentence. To ensure proper attention was paid to the task, a comprehension questions followed each sentence. We counterbalanced questions and answers of both stimuli and fillers. For the stimuli, we made sure that NP1 was presented first in 50% of the answers. For the fillers, we ensured that only 50% of the answers to the fillers were true. The study was conducted using a PC running the *Linger* software developed by Doug Rodhe. (http://tedlab.mit.edu/dr/Linger) or it was presented to the subjects on an Excel spreadsheet.

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[25]Thanks to Colin Phillips for suggesting to use passives.

¹³⁶⁶ ***Results and Analysis*** One subject was excluded from the analysis because of answering
¹³⁶⁷ only 46.5% of the unambiguous filler item questions correctly. Table 5 reports the percentages
¹³⁶⁸ of High Attachment per condition.

	RB	**CE**
Subject	56.6%	32.8%
Object	44.0%	40.1%

Table 5: Percentage of High Attachment Preferences
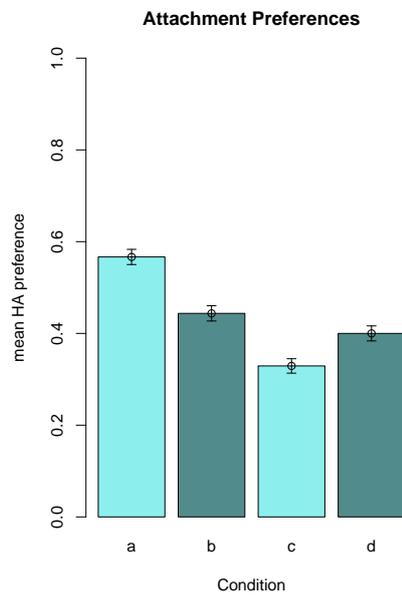
Figure 1: Summary of Attachment Preferences

¹³⁶⁹   Data were fit with mixed effects logistic regression using the lmer() function of the *lme4*
¹³⁷⁰ package (Bates et al., 2011) of the R analysis program (R core development team). In the main
¹³⁷¹ model *position* and *extractionsite* were fit as fixed factors, and subject and items as random
¹³⁷² factors. Random slopes were fit for both fixed effects and their interaction. The analysis showed
¹³⁷³ a significant effect of position (coefficient = 0.9915, SE = 0.4321, z-score = 2.300, p < .01).
¹³⁷⁴ A significant interaction *position*extractionsite* was also observed (coefficient = 1.5059, SE =
¹³⁷⁵ 0.6083, z-score = 2.476 p <.01). An additional analysis, looking at effects of extraction for
¹³⁷⁶ the two positions separately, showed a significant effect of extraction site in the RB condition
¹³⁷⁷ only (coefficient = 0.9672, SE = 0.4023, z-score = 2.404, p<.01), with significantly more HA
¹³⁷⁸ preferences for subject extraction than object extraction. Finally, analyzing effects of position
¹³⁷⁹ for the two extraction sites separately revealed an effect of position for subject extraction only
¹³⁸⁰ (coefficient = 1.7751, SE = 0.5954, z-score = 2.982, p <.001), with significantly more HA
¹³⁸¹ preferences for RB than CE.

Taken together these results show that, as predicted, the number of High Attachment decisions was significantly higher for subject extraction than for object extraction *in the RB condition only*, i.e. condition A.

4.2. Discussion

The results fully support our predictions. A Low Attachment preference was found in all conditions in which an unambiguous RCs reading had been forced: using object extraction in the RB environment in condition B, and both subject and object extraction in CE, in condition C and D. High Attachment preference was observed only when PRs were available i.e. limited to subject extraction in RB cases (condition A). The absence of a statistically significant difference between condition C and D shows that the asymmetry between condition A and B boils down to the availability of PRs. Notice that these results have been obtained despite the extremely conservative use of PR-complement taking verbs. We deliberately chose to limit the use of these verbs to better demonstrate the possible influence of PR availability in previous studies even in the presence of a restricted number (5) of PR-complement verbs, i.e. 25% of the stimuli.[26] Importantly, HA preference for the five PR-complement verbs taken separately raises to 68.8% in condition A, but it remains unvaried in condition B (43.8%). Conversely, when the five PR-complement verbs are excluded from the analysis, HA preference for condition A goes down to 50% and to 41.1% in condition B, which indicates an effect of verb type even with such restricted numbers. Table 8 reports the average HA per item, an asterisk marks the items containing PR-verbs.

An anonymous reviewer pointed out that these results might be offered an alternative explanation in terms of the higher memory load imposed on conditions B, C and D by object extraction and centre embedding respectively. It is well established that object extraction is harder to parse than subject extraction (on extraction see King & Just, 1991; Gibson, 1998; Gordon et al., 2001, among many others). The literature on the relative complexity of Center Embedding and Right Branching is more divided (see Gibson et al. 2005 for a review of the literature and a claim that RB is in fact harder than CE and Santi et al. 2011a,b for a critical review of the results in Gibson et al. and for additional data asserting the higher complexity of CE).

As the same reviewer suggests "*working memory demands are minimized in Condition A, while the three other conditions where low attachment is found each have at least one extra burden on working memory*".[27] The reviewer further suggests to strengthen our position avoiding structural manipulation, i.e. by manipulating the matrix verb, which is what we do in the next experiment.

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[26]As mentioned above, it is not always possible to have access to the sentence stimuli used in published work, and even less information (generally none) can be found about fillers. However, a quick look at the literature reveals the following: verbs taking PR-*complements* are used in 9 / 24 of the sentence stimuli (i.e. 37.5%) in Cuetos & Mitchell (1988); 8 / 20 (40%) in Brysbaert & Mitchell (1996); 6 / 16 (37.5%) in Carreiras & Clifton (1999); up to 13/24, i.e. more than 50% in Zagar et al. (1997). All these experiments revealed a HA preference in languages allowing PRs. Carreiras & Clifton (1993) used two sets of stimuli, the first set was used for experiments 1-4, this is the same set used by Carreiras & Clifton (1999), i.e. 37.5% of the sentences allow a PR interpretation. A second set of sentences was used for experiment 5. This contains at least 6 PR-verbs over 24 (*5, photograph; 15, draw; 16, bump into; 19 photograph; 21 meet; 12, see*), i.e. 25% of the stimuli.

[27]Two studies addressed the interaction of memory span and attachment preferences:Felser et al. (2003) with children, and Swets et al. (2007) with adults. Both reported a preference for *local* attachment in subjects with high working memory span. While these results do not directly inform us on the interaction of object RCs and higher memory load with attachment preferences, they might in fact predict this interaction to go in the opposite direction we observed, which would explain the relatively high percentage of HA in the Object RC condition and ultimately strengthen our results.

Item	Condition A	Condition B	Condition C	Condition D	Matrix V
1	50	25	33.3	11.1	*call*
2*	44.4	25	75	66.6	*watch*
3	0	22.2	0	37.5	*warn*
4	50	33.3	55.5	50	*interview*
5	50	50	44.4	33.3	*help*
6	22.2	25	62.5	22.2	*recognize*
7	88.8	33.3	0	62.5	*be introduced to*
8*	87.5	100	29.4	25	*observe*
9*	75	62.5	22.2	22.2	*admire*
10*	100	0	37.5	44.4	*see*
11*	100	100	0	62.5	*hate*
12	50	33.3	11.1	0	*shoot*
13	100	62.5	44.4	33.3	*help*
14	33.3	0	50	33.3	*warn*
15	100	77.7	25	37.5	*hide*
16*	62.5	44.4	0	25	*hear*
17*	50	50	44.4	44.4	*listen*
18	33.3	50	50	77.7	*run over*
19	11.1	33.3	25	50	*greet*
20*	50	44.4	0	25	*intercept*
Total	56.6	44.3	32.9	40	

Table 6: Experiment 1: Percentage of HA Preferences by item

4.3. Experiment II: Manipulating the matrix verb

As discussed in section 2.1, PRs behave much like other types of clausal complements in being selected only by a restricted class of verbs. Among these, perceptual (e.g. *see, hear, feel* etc.) or quasi-perceptual (e.g. *photograph, film, record*), are the ones that most readily allow for PRs across languages.

To further test the role of PR availability in attachment, and avoid possible structural confounds in an additional experiment we tested the effects of PR availability on RC attachment preference by manipulating the type of verb in the matrix clause. We used sentences containing strings ambiguous between a RC and PR interpretation, which displayed perceptual or quasi-perceptual verbs, and identical sentences in which the same string could not only be interpreted as a RC because of the stative nature of the matrix verb. If our account holds, we expect LA to arise in the unambiguous RC condition and HA in the ambiguous PR / RC condition.

Method and participants   (N=30) Italian native speakers participated in an offline questionnaire on attachment preferences in complex DPs. All participants gave their informed consent before taking part in the study and were naive as to the goals of the experiment.

Materials and Design   24 minimal pairs of target sentences were constructed, keeping everything but the matrix verb constant. Condition A contained a PR taking predicates (e.g. *see, hear, film, photograph* a.o.), while Condition B contained stative predicates (e.g. *lives with, works with, is married to*) which only allow for NP complements, and therefore RC interpretation of the embedded clause. Two lists were created, with 24 target and 80 fillers. As in the previous experiment, the fillers did not contain either RCs or SCs / PRs. (81) depicts an example of the sentence stimuli used.

(81)   **Stimuli Experiment II**

    a.   PR / RC CONDITION: PR-VERBS
        Gianni ha visto il figlio del medico che correva
        G. saw the son of the doctor that ran
        G. saw the son of the doctor running
    b.   RC ONLY CONDITION: STATIVE VERBS
        Gianni vive con il figlio del medico che correva
        G. lives with the son of the doctor that ran
        G. lives with the son of the doctor running

<div align="center">

A. IL FIGLIO CORREVA (*the son ran*)
B. IL DOTTORE CORREVA (*the doctor ran*)

</div>

Each subject only saw one version of each sentence. To ensure proper attention was paid to the task, a comprehension question followed each sentence. The questions and answers to both targets and fillers were counterbalanced so that NP1 was presented first in 50% of the answers, 50% of the answer to the fillers were true. The study was conducted using *Google Questionnaire*.

Results and Analysis   All subjects performed at ceiling on the filler items. Table 7 reports the percentages of High Attachment preference per condition.

Data were fit with mixed effects logistic regression using the lmer() function of the *lme4* package (Bates et al., 2011) of the R analysis program (R core development team). In the main

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Eventive	Stative
78.6%	24.2%

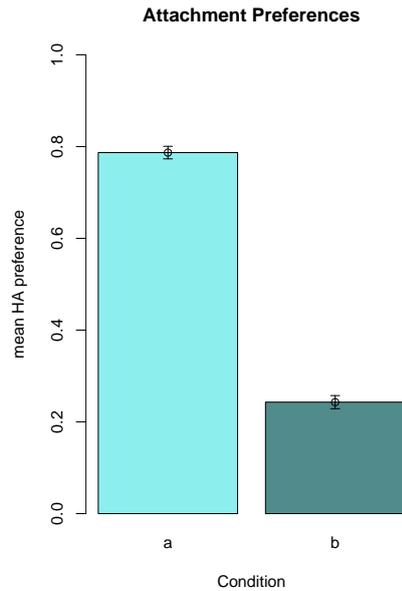Table 7: Percentage of High Attachment Preferences

Attachment Preferences

Figure 2: Summary of Attachment Preferences

model *verb-type* was fit as fixed factor, and subject and items as random factors. Intercept and random slopes were fit for the fixed effect. The analysis showed a highly significant effect of verb-type (coefficient = -3.95604, SE = 0.51992, z-score = -7.609, p < .0001), with significantly more HA preferences for event-taking (Condition A) than entity-taking (Condition B) verbs.

As predicted, LA was observed with stative predicates, which can only take nominal complements and with which the embedded clause can only be interpreted as a RC. A very strong HA preference emerged with perceptual predicates, which can take both nominal complements and clausal complements of the PR type.

5. Conclusions

In this paper we have shown that the literature on RC attachment preferences in complex DPs has ignored a grammatical distinction between the string identical RCs and PRs. We have argued that this distinction potentially confounds previous results in this area of research and claimed that alleged cross-linguistic differences in parsing preferences can be reduced to this grammatical distinction, once this confound is dealt with. Support for this claim was discussed, from both previously published and original results. Looking back at the previous literature we see that, all else being equal, once a PR reading is excluded, i.e. once genuine RCs only are considered, LA

Item	Condition A	% HA	Condition B	% HA
1	*vedere / see*	92.8	*vive con / lives with*	25
2	*sentire / hear*	68.7	*lavora con / works with*	14.2
3	*sentire / hear*	71.4	*si allena con / trains with*	0
4	*guardare / look at*	62.5	*sposato / married*	7.1
5	*ascoltare / listen to*	92.8	*lavora per / works for*	18.7
6	*osservare / observe*	87.5	*fidanzata con / engaged with*	28.5
7	*sorprendere / surprise*	100	*affezionato a / is attached to*	56.2
8	*beccare / catch*	100	*si esercita con / exercises with*	28.5
9	*osservare / observe*	100	*innamorata di / in love with*	25
10	*guardare / look at*	87.5	*imparentato con / family of*	7.1
11	*fotografare / photograph*	71.4	*odia / hates**	31.2
12	*vedere / see*	87.5	*convive / cohabits*	35.7
13	*immaginare / imagine*	78.5	*cena con / dines with*	31.2
14	*sognare / dream*	87.5	*sposata con / married to*	14.2
15	*ritrarre / portray*	35.7	*lavora per / works for*	6.2
16	*filmare / film*	65.2	*frequenta / hangs out with*	42.8
17	*registrare / record*	62.5	*lavora per / works for*	13.6
18	*guardare / look at*	71.4	*ama / loves**	55.5
19	*fotografare / photograph*	66.6	*collabora / collaborates*	52.3
20	*guardare / look at*	76.1	*studia con / studies with*	44.4
21	*filmare / film*	55.5	*sposato / married*	4.7
22	*immaginare / imagine*	90.4	*lavora con / works with*	44.4
23	*vedere / see*	55.5	*esce con / goes out with*	4.7
24	*ascoltare / listen to*	90.4	*studia con / studies with*	44.4
Total		78.6 %		24.2 %

Table 8: Experiment 2: Percentage of HA Preferences by item.

preference is observed.

Our experiments on RC-attachment in Italian further confirm this prediction: in the first experiment we have shown that ambiguity is resolved differently when the same sequence, NP1 of NP2 + RC, is embedded in different positions, and crucially LA preference arises in all cases in which a PR reading was excluded through grammatical means (i.e. object extraction, position of embedding), HA preference, on the other hand, is found when PRs are available (subject extraction in Right Branching context). Importantly, the first experiment was designed to replicate previous studies, i.e. only a small subset of the stimuli contained verbs that can select for a PR. The size of the effect is also representative of those earlier studies (the observed 56% HA over all verb types goes up to 68.8 when only PR compatible verbs are considered), which shows that even a small number of PR-verbs can strongly influence the final result. The second experiment directly tackles the role of the matrix verb in determining attachment preferences: we constructed minimal pairs of sentences containing either PR-verbs as matrix predicates or stative verbs that can only select for NP complements (and therefore in which the embedded clause can only be parsed as a Relative Clause). The results are strongly in line with our prediction (78.6% HA in the PR vs. 24.2% HA in the RC-only condition), supporting the claim that a strong LA preference is to be expected in the absence of PR ambiguity.

To interpret these results, and more generally the residual variation across languages and syntactic structures, we have proposed that when both PRs and RCs are available (in the absence of additional factors such as prosody, plausibility etc.) the parser prefers PRs over RCs because the former are simpler both at the structural (i.e. PRs are Small Clauses, while RCs are full clauses) and interpretive level (PRs require simpler presuppositions at the contextual level). This account also allowed us to dispense with parametrization of principles such as Relativized Relevance (Frazier, 1990) / Predicate Proximity (Gibson et al., 1996, 1999).

We conclude that PR availability plays a major role in shaping attachment preference and we hypothesize that the observed residual differences across languages are determined by this factor. This does not amount to say that PR availability is the *only* factor involved in deciding attachment preferences but that the origin of many otherwise obscure asymmetries in attachment reported in the literature can be traced back to this factor. We have shown that speakers of those languages that allow for PRs in the relevant contexts prefer High Attachment, while speakers of languages that disallow PRs in those same contexts prefer Low Attachment. Moreover, within the same language, we saw that whenever PRs are not available, a Low Attachment preferences are observed universally. Obviously much more work needs to be carried on to fully support these claims: both at the experimental and theoretical levels a great effort is needed to describe the availability of PRs across syntactic environments and languages (keeping in mind that PR availability in a given structure is not the same across different languages, e.g. Italian vs. Spanish nominals) and thus make precise predictions about attachment.

Future work will need to address several questions left open at present: how and when does the parser decide between PRs and RCs? Does the typical preference for Nominal over Clausal complements (based mostly on a relatively small subset of verbs allowing clausal complements) also extend to Small Clauses? i.e. could the parser already prefer a SC parse in the presence of PR-complement type verbs *before* reaching the embedded complementizer? If a PR preference is confirmed online, is it possible to modulate it through context manipulation? If so, would the context play a role at the very initial stage of parsing or only at a later point, i.e. is the preference

structurally or context driven?[28]

Other questions include the role of plausible differences among PR-complement and PR-adjunct taking verbs, the prosody of PRs and more generally SCs, and finally the relation between PR preference and memory span. We are currently running experiments to test many of these questions and to extend the empirical basis of the claim to cover more languages and syntactic environments. Results on Spanish, Portuguese (Grillo et al., 2012), English(Grillo et al., 2013a) and Greek (Grillo & Spathas, 2013) further support these claims. Preliminary results from timed questionnaires also suggests an online preference for PRs / SCs over RCs in both European Portuguese and English (Grillo et al., 2013b). Finally, Costa et al. (2013) addressed the question of acquisition of PRs and found evidence for early knowledge of the obligatory HA in these structures and in Prepositional Infinitive Constructions in European Portuguese.

On these bases we have argued that once PRs are taken into the equation, the Universality of Parsing principles of locality can be stated once again. The question of whether these principles act independently from or in harmony with other factors (lexical, semantics, plausibility, prosody, context, frequency) is completely independent from this claim. What we meant to address is the residual variation that appeared to be present *after* these factors were taken into account; this residual variation created a huge theoretical problem that might be manageable now that the role of PR ambiguity in attachment is fully recognized.

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[28]Remember that Desmet et al. (2002b) reports a clear but delayed effect of context in attachment in Dutch, but it is hard to judge from the outset whether PR availability acted as a potential confounding factor in that experiment.

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Appendix A. Items Experiment 1

Note: items containing a clear PR taking verb are indicated with an asterisk.

1. a. il dottore ha chiamato il figlio del signore che veniva attaccato dai poliziotti
   b. il dottore ha chiamato il figlio del signore che i poliziotti avevano attaccato
   c. il figlio del signore che veniva attaccato dai poliziotti ha superato la prova
   d. il figlio del signore che i poliziotti stavano attaccando ha superato la prova
   chi era attaccato ? figlio signore

2. a. il barista ha guardato l' amico del cliente che veniva sorpreso dai colleghi *
   b. il barista ha guardato l' amico del cliente che i colleghi avevano sorpreso
   c. l' amico del cliente che veniva sorpreso dai colleghi è molto è
   d. l' amico del cliente che i colleghi avevano sorpreso è molto buono
   chi era sorpreso ? amico cliente

3. a. l' avvocato ha diffidato il padre del ragazzo che veniva tradito dai compagni
   b. l' avvocato ha diffidato il padre del ragazzo che i compagni avevano tradito
   c. il padre del ragazzo che veniva tradito dai compagni è molto amareggiato
   d. il padre del ragazzo che i compagni avevano tradito è molto amareggiato
   chi era tradito ? ragazzo padre

4. a. il cronista ha intervistato l' amico del senatore che veniva colpito dai rivoltosi
   b. il cronista intervistato l' amico del senatore che i rivoltosi avevano colpito
   c. il amico del senatore che veniva colpito dai rivoltosi è molto diligente
   d. il amico del senatore che i rivoltosi avevano colpito è molto diligente
   chi era colpito ? amico senatore

5. a. il duca ha aiutato il figlio del sarto che veniva aggredito dai ladri
   b. il duca ha aiutato il figlio del sarto che i ladri avevano aggredito
   c. il figlio del sarto che veniva aggredito dai ladri è ancora intristito
   d. il figlio del sarto che i ladri avevano aggredito è ancora intristito
   chi era aggredito ? figlio sarto

6. a. il visitatore ha riconosciuto il collega del dirigente che veniva zittito dai moderatori
   b. il visitatore ha riconosciuto il collega del dirigente che i moderatori avevano zittito
   c. il collega del dirigente che veniva zittito dai moderatori è poco cortese
   d. il collega del dirigente che i moderatori avevano zittito è poco cortese
   chi era zittito ? collega dirigente

7. a. il direttore ha conosciuto il segretario del supervisore che veniva promosso dai colleghi
   b. il direttore ha conosciuto il segretario del supervisore che i colleghi avevano promosso
   c. il segretario del supervisore che veniva promosso dai colleghi è molto influente
   d. il segretario del supervisore che i colleghi avevano promosso è molto influente
   chi era promosso ? segretario supervisore

8. a. il marchese ha osservato la nipote della ballerina che veniva protetta dalle amiche *
b. il marchese ha osservato la nipote della ballerina che le amiche avevano protetto
c. la nipote della ballerina che veniva protetta dalle amiche è davvero affascinante
d. la nipote della ballerina che le amiche avevano protetto è davvero affascinante
chi era protetta ? nipote ballerina

9. a. il tecnico ha ammirato il sosia del calciatore che veniva esaltato dai tifosi *
b. il tecnico ha ammirato il sosia del calciatore che i tifosi avevano esaltato
c. il sosia del calciatore che veniva esaltato dai tifosi è proprio bravo
d. il sosia del calciatore che i tifosi avevano esaltato è proprio bravo
chi era esaltato ? sosia calciatore

10. a. la cameriera ha visto l' amico del poliziotto che veniva insultato dai teppisti *
b. la cameriera ha visto l' amico del poliziotto che i teppisti avevano insultato
c. l' amico del poliziotto che veniva insultato dai teppisti è stato ricompensato
d. l' amico del poliziotto che i teppisti avevano insultato è stato ricompensato
chi era insultato ? amico poliziotto

11. a. lo studente ha odiato il nipote del preside che veniva premiato dai giurati
b. lo studente ha odiato il nipote del preside che i giurati avevano premiato
c. il nipote del preside che veniva premiato dai giurati è stato avvertito
d. il nipote del preside che i giurati avevano premiato è stato avvertito
chi era premiato ? preside nipote

12. a. la psicolabile ha sparato al maestro del pianista che veniva applaudito dai musicisti
b. la psicolabile ha sparato al maestro del pianista che i musicisti avevano applaudito
c. il maestro del pianista che veniva applaudito dai musicisti è molto orgoglioso
d. il maestro del pianista che i musicisti avevano applaudito è molto orgoglioso
chi era applaudito ? pianista maestro

13. a. la signora ha aiutato il garzone del cuoco che veniva chiamato dai clienti
b. la signora ha aiutato il garzone del cuoco che i clienti avevano chiamato
c. il garzone del cuoco che veniva chiamato dai clienti è stato licenziato
d. il garzone del cuoco che i clienti avevano chiamato è stato licenziato
chi era chiamato ? cuoco garzone

14. a. la talpa ha avvertito il cugino del ragazzo che veniva spiato dai carabinieri
b. la talpa ha avvertito il cugino del ragazzo che i carabinieri avevano spiato
c. il cugino del ragazzo che veniva spiato dai carabinieri merita una lezione
d. il cugino del ragazzo che i carabinieri avevano spiato merita una lezione
chi era spiato? ragazzo cugino

15. a. il responsabile ha nascosto la sorella della segretaria che veniva inseguita dai malviventi
b. il responsabile ha nascosto la sorella della segretaria che i malviventi avevano inseguito
c. la sorella della segretaria che veniva inseguita dai malviventi è tanto cara
d. la sorella della segretaria che i malviventi avevano inseguito è tanto cara
chi era inseguita ? segretaria sorella

16. a. la contessa ha ascoltato l' ospite del marchese che veniva interrotto dai commensali *
b. la contessa ha ascoltato l' ospite del marchese che i commensali avevano interrotto

c. l' ospite del marchese che veniva interrotto dai commensali è davvero sguaiato

d. l' ospite del marchese che i commensali avevano interrotto è davvero sguaiato

chi era interrotto ? marchese ospite

17. a. la polizia ha sentito il vicino del dottore che veniva interrogato dalla portiera *

b. la polizia ha sentito il vicino del dottore che la portiera aveva interrogato

c. il vicino del dottore che veniva interrogato dalla portiera è sempre distratto

d. il vicino del dottore che la portiera aveva interrogato è sempre distratto

chi era interrogato ? dottore vicino

18. a. il camionista ha investito il nipote del farmacista che veniva distratto dai clienti

b. il camionista ha investito il nipote del farmacista che i clienti avevano distratto

c. il nipote del farmacista che veniva distratto dai clienti è molto sensibile

d. il nipote del farmacista che i clienti avevano distratto è molto sensibile

chi era distratto ? farmacista nipote

19. a. la presidentessa ha salutato il corriere del commerciante che veniva eletto dai rappresentanti

b. la presidentessa ha salutato il corriere del commerciante che i rappresentanti avevano eletto

c. il corriere del commerciante che veniva eletto dai rappresentanti è stato fortunato

d. il corriere del commerciante che i rappresentanti avevano eletto è stato fortunato

chi era eletto ? commerciante corriere

20. a. l' investigatore ha intercettato il sostituto del ministro che veniva corrotto dai finanzieri *

b. l' investigatore ha intercettato il sostituto del ministro che i finanzieri avevano corrotto

c. il sostituto del ministro che veniva corrotto dai finanzieri ha poco potere

d. il sostituto del ministro che i finanzieri avevano corrotto ha poco potere

chi era corrotto ? ministro sostituto

Appendix B. Items Experiment 2

1. a. Gianni ha visto il figlio del medico che correva la maratona

b. Gianni vive con il figlio del medico che correva la maratona

il figlio corre

il medico corre

2. a. Maria ha sentito la nonna della ragazza che gridava

b. Maria lavora con la nonna della ragazza che gridava

la ragazza grida

la nonna grida

3. a. Pietro ha sentito il maestro del ragazzo che cantava

b. Pietro si allena con il maestro del ragazzo che cantava

il maestro canta

il ragazzo canta

55

4. a. lo scrittore guardava la zia della ragazza che saltava
   b. lo scrittore ha sposato la zia della ragazza che saltava
   la ragazza salta
   la zia salta

5. a. Silvia ascoltava la figlia del poliziotto che parlava
   b. Silvia lavora per la figlia del poliziotto che parlava
   la figlia parla
   il poliziotto parla

6. a. Paola osservava l'amico del politico che cucinava
   b. Paola è fidanzata con l'amico del politico che cucinava
   il politico cucina
   l'amico cucina

7. a. Mario ha sorpreso l'assistente dell'attrice che rubava
   b. Mario è affezionato all'assistente dell'attrice che rubava
   l'assistente ruba
   l'attrice ruba

8. a. l'avvocato ha beccato l'autista del vicino che fumava
   b. l'avvocato si esercita con l'autista del vicino che fumava
   il vicino fuma
   l'autista fuma

9. a. Lucia osservava il vicino del segretario che si allenava
   b. Lucia è innamorata del vicino del segretario che si allenava
   il vicino si allena
   il segretario si allena

10. a. Giorgio guardava il nipote dell'infermiera che mangiava
    b. Giorgio è imparentato col nipote dell'infermiera che mangiava
    l'infermiera mangia
    il nipote mangia

11. a. Carlo ha fotografato il collega dell'impiegato che rubava
    b. Carlo odia il collega dell'impiegato che rubava
    il collega ruba
    l'impiegato ruba

12. a. Sara ha visto l'amico del giudice che guidava
    b. Sara convive con l'amico del giudice che guidava
    il giudice guida
    l'amico guida

13. a. Francesco immaginava l'amica dell'estetista che lavorava
    b. Francesco cena con l'amica dell'estetista che lavorava
    l'amica lavora
    l'estetista lavora

14. a. Rachele ha sognato l'amico del cugino che beveva
    b. Rachele è sposata con l'amico del cugino che beveva
    il cugino beve
    l'amico beve

15. a. Ennio ha ritratto il fratello della donna che fumava
    b. Ennio lavora per il fratello della donna che fumava
    il fratello fuma
    la donna fuma

16. a. Filippo ha filmato l'agente del giocatore che russava
    b. Filippo frequenta l'agente del giocatore che russava
    il giocatore russa
    l'agente russa

17. a. Maria ha registrato il cugino dell'avvocato che parlava
    b. Maria lavora per il cugino dell'avvocato che parlava
    il cugino parla
    l'avvocato parla

18. a. Roberto ha guardato l'amico del pizzaiolo che ballava
    b. Roberta ama l'amico del pizzaiolo che ballava
    il pizzaiolo balla
    l'amico balla

19. a. Simona ha fotografato il vicino dell'infermiera che studiava
    b. Simona collabora col vicino dell'infermiera che studiava
    il vicino studia
    l'infermiera studia

20. a. Michele guardava il fratello del manager che scalava
    b. Michele studia col fratello del manager che scalava
    il manager scala
    il fratello scala

21. a. Antonio ha filmato la sorella dell'amica che scriveva
    b. Antonio ha sposato la sorella dell'amica che scriveva
    la sorella scrive
    l'amica scrive

22. a. Mario immaginava l'amica della collega che ballava
    b. Mario lavora con l'amica della collega che ballava
    la collega balla
    l'amica balla

23. a. Massimo ha visto l'insegnante dell'amica che guidava
    b. Massimo esce con l'insegnante dell'amica che guidava
    l'insegnante guida
    l'amica guida

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24. a. Anna ascoltava il figlio del vicino che cantava

    b. Anna studia col figlio del vicino che cantava

      il vicino canta

      il figlio canta

Appendix C. Pseudo Relatives across languages

Appendix C.1. Romance Languages

Table C.9 contains a list of languages for which PR-availability was discussed in the litera-ture.

Language	Sentence	Reference
Spanish	He visto a Pedro que corria	Rafel (1999)
Italian	Ho visto Gianni che correva	Radford (1975, 1977); Graffi (1980), Taraldsen (1981); Burzio (1981, 1986), Guasti (1988, 1992, 1993); Cinque (1992), Rizzi (1992); Casalicchio (2013).
French	J'ai vu Jean qui courait	Kayne (1981); Labelle (1996), Côté (1999); Koenig & Lambrecht (1999), Koopman & Sportiche (2010)
Galician	Eu vin a Xoán que corría	Rafel (1999)
European Portuguese	Eu vejo o João que corre	Barros de Brito (1995); Fernandes (2012)

Table C.9: PRs across languages

Appendix C.2. Dutch

(82-a,b) illustrate PRs in Dutch:

(82)   a.   Ik zag Jan die naar huis rende

                I saw J who to home run-past

        b.   Ik zag Jan naar huis rennen

                I saw J to home run-inf

(83) illustrates the Temporal restriction on PRs in Dutch: Temporal mismatch between future Tense in the embedded clause and past tense on the matrix verb prevents a PR interpretation. The appositive reading is available, but, as usual, it requires special comma intonation (i.e. longer break between Jan and die). We are grateful to Ad Neeleman and Hans van de Koot for providing these judgments.

(83)   *Ik zag Jan die naar huis zal rennen

        I saw Jan who to home will run-inf

Appendix C.3. Greek

(84) illustrates PRs in Greek (We are grateful to Giorgos Spathas for providing these judg-ments:

(84)   a.   Idha   ton Jani pu eplene   ton skilo.
              saw.PERF.I the John that washed.IMPERF the dog
              I saw John washing the dog.

      b.   Paratirusa   ton Jani pu eplene   ton skilo.
              observed.IMPERF.I the John that washed.IMPERF the dog
              I was observing John washing the dog.

(85) illustrates the Temporal restrictions on PRs in Greek. The variant with present might be possible in a situation where it is clear that my observing coincided with John's washing the dog (i.e. an extended present for wash).

(85)   Paratirusa ton Jani pu eplene/ *pleni/ *tha pleni ton skilo.
         observed.IMPERF.I the John that wash.PAST.IMPERF/ wash.PRES.IMPERF/ will wash.
         IMPERF the dog I was observing John washing the dog

(86) shows that the same structures are not allowed with Relative pronouns *o opios*. As usual, there is a marginal, and irrelevant for our purposes, reading in which examples like (86) are ok as Restrictive RCs, i.e. when the context involves more than one John.

(86)   *Paratirusa ton Jani o opios eplene ton skilo.
         observed.IMPERF.I the John the.NOM.SG who.NOM.SG washed.IMPERF the dog
         'I was observing John washing the dog.'

Appendix C.4. Serbo-Croatian

As (87) shows, Serbo-Croatian freely allows PRs (We are grateful to Boban Arsenijević for providing these data):

(87)   Video sam Jovana koji je ljubio devojku.
         seen am Jovan.Acc which is kissed girl I saw Jovan kissing the girl

While (87-a) is ambiguous between a PR and the (marginal and, once again, irrelevant) RC interpretation, RC is the only available interpretation in (88).

(88)   Video sam Jovana koji ?e poljubiti devojku.   RC only / *PR
         seen am Jovan.Acc which will kiss.Inf girl

(89) shows that PRs are also unavailable with perfective aspect (89-a) and stative predicates (89-b). In both cases the RC reading is of course available.

(89)   a.   Video sam Jovana koji je ljubio / *poljubio devojku. seen am Jovan.Acc which is kissed.Imperf / Perf girl

      b.   *Video sam Jovana koji je znao put do grada. seen am Jovan.Acc which is known way to city

Appendix C.5. Korean and Japanese

On Japanese and Korean see Shimoyama; Kim's (1999; 2009) discussion of Internally Headed Relative Clauses (IHRC) and in particular, the discussion in Kim (2009) of the parallelism between the latter and *Perceptual Constructions*, which appear to display the same properties of PRs. (90), is ambiguous between a SC / perceptual construction reading and a restrictive RC reading, is an example of the relevant structures in Japanese.

(90)   Watashi-wa [kocchi-ni hashitte-kuru Nao]-o mita.
       I-top here-to run-come Nao-acc saw
       I saw Nao running this way.

(91) and (92) illustrate IHRCs and Perceptual Constructions respectively, both are ambiguous between a restrictive and non-restrictive reading. See Kim (2009) for a detailed comparison and discussion of their syntax and semantics.

(91)   The IHRC construction: (Kim, 2009, ex. 1, p. 346)
       John-un [[totwuk-i tomangka-n]-un kes]-ul cap-ess-ta.
       J.-TOP [[thief-NOM run.away-IMPRF]-REL KES]-ACC catch-PST-DECL
       John caught a/the thief while he (= the thief) was running away.

(92)   The perception construction: (Kim, 2009, ex. 2, p. 346)
       John-un [[totwuk-i tomangka-n]-un kes]-ul po-ess-ta.
       J.-TOP [[thief-NOM run.away-IMPRF]-REL KES]-ACC see-PST-DECL
       John saw the event of the thief running away.

Appendix C.6. Basque

Basque does not allow PRs. (We are grateful to Larraitz Zubeldia for providing these data and judments)

(93)   Gitarra jo-tzen ari zen Jon ikus-i d-u-t
       guitar.det.sg play-ipfv prog 3sg.abs.pst.comp Jon see-pfv 3sg.abs.prs-have-1sg.erg
       I saw John that plays guitar (RC only)

The translation given to (93) by my Basque informer is the following: "*of all the Jon I know, I saw the one that plays guitar*. The PR meaning can be expressed with the following sentence:

(94)   Jon gitarra jotzen ari zela ikusi dut. Jon gitarra jo-tzen ari ze-la ikus-i d-u-t
       Jon guitar.det.sg play-ipfv prog 3sg.abs.pst.comp see-pfv 3sg.abs.prs-have-1sg.erg I saw
       that Jon was playing the guitar I saw John playing the guitar / while he was playing the
       guitar

Appendix C.7. Chinese

Given that DE-modifiers can be freely constructed with proper names (95), one might suppose that they are akin to PRs.[29]

(95)   Mouren kaiqiang dasi-le zhanzai yangtaishang-de Xiaoming-de puren.
       Someone shoot dead-ed standing on the balcony DE Xiaoming's servant.
       Someone shot the servant of [Xiaoming$_i$ who$_i$ was standing on the balcony].

However, a more in-depth analysis based on a thorough comparison between DE-modifiers and post nominal Small Clauses shows that the former cannot be treated as PRs.

   i. DE-modifiers are incompatible with a propositional reading, while genuine SCs can have propositional contents (also in Chinese).

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[29]We are grateful to Shuyin Zhang for her extensive help with grammaticality judgements on the materials presented in this section.

ii. DE-modifiers allow for temporal mismatch between the event described in the matrix sentence and the event described in the embedded clause, which genuine SCs, also in Chinese do not;

iii. De-modifiers are available with both subjects and objects, while genuine SCs in Chinese can only be construed with subjects.

iv. DE-modifiers are not bound by any aspectual restrictions, while post-nominal SCs are subjected to the same restrictions found in PRs.

As mentioned above, using an inanimate pronominal (or a definite description that clearly refers to an eventuality) to refer to the content of PRs and Scs (of the Acc-ing type) is a good diagnostics to establish propositional status (96).

(96) a. Ciò che ho visto è Gianni che correva
          What I saw is Gianni that was running
      b. What I saw is John running

DE-modifiers (97-a,b), contrary to post-nominal SCs in Chinese (97-c), however, cannot be made to co-refer to eventive NPs, which shows that they cannot be interpreted as propositions.

(97) a. *wo kanjian de   shiqing **shi zhanzai yangtaishang de**
          I   saw   DE event   is
          Xiaoming.
          standing on the balcony DE Xiaoming.
          The event I saw is Xiaoming standing on the balcony.
      b. *wo kanjian de shiqing **shi zai paubu de** Xiaoming.
          I   saw   De event   is   **-ing run DE** Xiaoming
          What I saw is Xiaoming running
      c. wo kanjian de   shiqing shi Xiaoming **zai paobu**
          I   saw   DE event   is Xiaoming **-ing run**
          The event I saw is Xiaoming running

Conversely, as (98) shows, post-nominal SCs can only refer to eventualities and not to entities. As the glosses show, the same is true of English Acc-ing constructions:

(98) *Wo kanjian de ren shi Xiaoming zai paobu.
      I saw DE the person is Xiaoming ing run.
      The person I saw is Xiaoming running.

The claim that DE-modifiers are not at all like PRs is further supported by the lack of constraints on their temporal properties. While the event denoted by PRs has to develop within the same temporal interval of the matrix event, a temporal mismatch is perfectly available with DE-modifiers (99).

(99) (zuotian) mouren kanjian-le [(mingtian) yao zhanzai yangtaishang-de] Xiaoming.
      yesterday someone saw [(tomorrow) will standing on the balcony-DE] Xiaoming
      Yesterday someone saw the Xiaoming who is going to stand on the balcony tomorrow.

Temporal mismatch, however, is not allowed with post-nominal SCs:

(100) *Wo (zuotian) kanjian de shiqing shi Xiaoming (jintian) zai paobu.

I (yesterday) saw DE event is Xiaoming (today) ing run.

The event I saw yesterday is Xiaoming running today.

Contrary to PRs, DE-modifiers can be construed with both subjects and objects of the embedded clause (101-a,b). Post-nominal SCs, on the other hand, behave just like PRs and can only appear with subjects (101-c,d).

(101) a. wo kanjian qinguo nage nvhai de   nage nanhai
           I   saw   kissed girl DE   boy
           I saw the boy that kissed the girl
       b. wo kanjian nage nanhai qinguo de   nvhai
           I   saw   boy kissed DE   girl
           I saw the girl that the boy kissed.
       c. wo kanjian Mary zaiqin Xiaoming
           I   saw   Mary -ing   kiss   Xiaoming
           I saw Mary kissing Xiaoming
       d. *wo kanjian Mary Xiaoming zai   qin.
           I   saw   Mary Xiaoming -ing kiss
           *I saw Mary Xiaoming kissing.

Finally, aspectual restrictions typically found with PRs are observed with post-nominal SCs (102-c,d) but not DE-modifiers (102-a,b):

(102) a. wo kanjian zai paobu de Xiaoming.
           I   saw   ing run   DE Xiaoming.
           I saw Xiaoming who is running
       b. wo kanjian hui   yingyu de Xiaoming
           I   saw   knows English DE Xiaoming
           I saw Xiaoming who knows English
       c. wo kanjian Xiaoming zai   paobu.
           I   saw   Xiaoming -ing run
           I saw Xiaoming running.
       d. *wo kanjian Xiaoming zai hui   yingyu.
           I   saw   Xiaoming -ing know English
           *I saw Xiaoming knowing English.

(102) shows that while pronominal DE-modifiers can be freely used with both eventive and stative predicates, post-nominal SCs (just like PRs and Acc-ing constructions) are completely unacceptable with stative predicates (e.g. *to know English*).

Defining the exact properties of DE-modifiers is beyond the scope of this paper, it suffices here to demonstrate that these constructions share a number of essential properties with RCs and are very unlike PRs.

Appendix C.8. Romanian

Romanian clearly does not allow PRs (Thanks to Anca Sevcenco for providing these judgments): There is no SC reading for (103), only the restrictive relative reading is allowed:

(103) . Ion a văzut fata care alerga.

Ion has seen girl.the who was running

Ion saw the girl that was running

Romanian seems to behave like English in that to obtain the SC reading, the verb in the subordi-
nate must be changed into a gerunziu / gerundive (non-predicative mood):

(104) Ion a văzut fata alergând.

Ion has seen girl.the running-GERUNZIU

Ion saw the girl running.